

MODERN Machine Shop

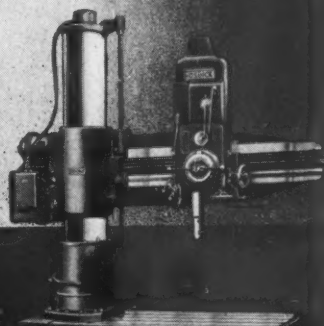
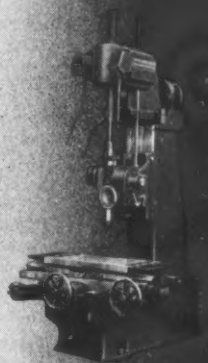
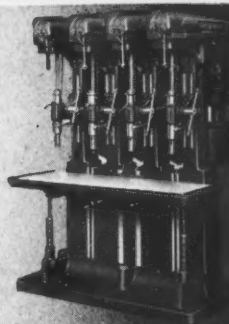
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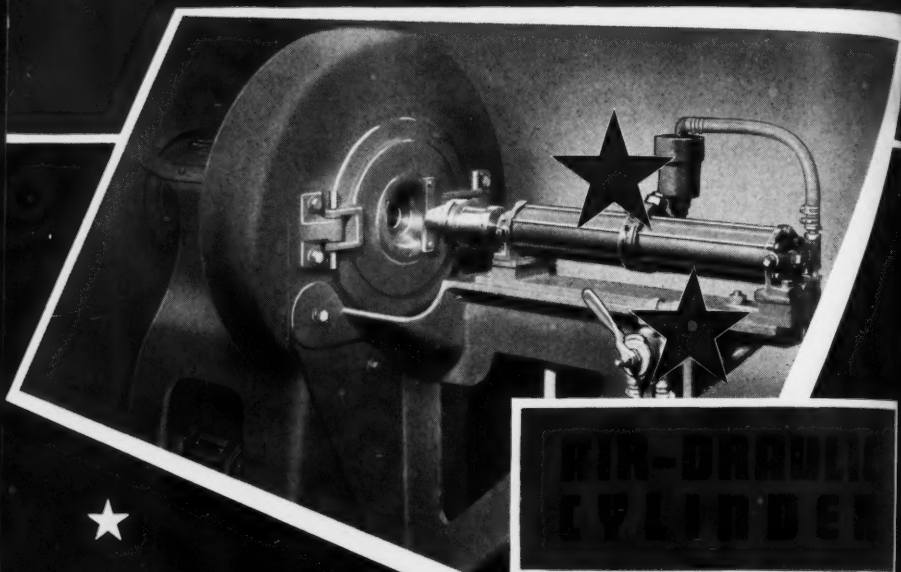
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MODERN Machine Shop

NOVEMBER, 1942
VOLUME 15 • NUMBER 6

Contents

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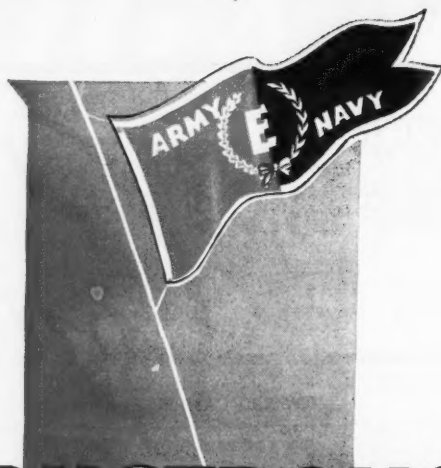
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MODERN Machine Shop

NOVEMBER, 1942

VOL. 15, No. 6

CINCINNATI, OHIO

We Present ---

— as the feature article in this month's issue — an outline of the more outstanding operations in the production of aircraft propellers as these operations are performed in the plant of the Nash-Kelvinator Corporation. The operations presented here involve some very nice tool engineering and should be of interest to every mechanical executive and engineer.

— as the second article — a discussion of some "Improvements in Nitriding Techniques" that have been developed in the Detroit plant of N. A. Woodworth Company. This article tells how the nitriding job is done without being too technical for practical plant men.

— on page 138 — a pretty good idea of the sort of thing that might happen in this country if we were to lose our war with the Axis. Mr. Fair's version of the situation is no stretch of the imagination — his article is a mild picture of the condition that exists in every country that has come under the domination of the Axis.

— on page 150 — a discussion of some of the tools and methods in use in the California plant of the Vega Aircraft Corporation. You will find it interesting.

— on page 160 — some interesting suggestions under the heading "Ideas from Readers."

The cartoon series "There's One In Every Shop" will be missing for a time due to the fact that our old friend Wesser — the creator of this series of drawings — has been called into the service of his country again. But this time we understand he has chosen the Army instead of the Navy, in which he served in the first World War, apparently having had enough of sub-spotting in the "crow's nest" of a bucking, pitching destroyer in a gale of wind with the temperature more or less below zero. We all wish him luck and a safe return.

Aircraft Propeller Production at Nash- Kelvinator Plant

The production of airplane propellers involves the use of a number of highly specialized machine tools and fixtures, some of which are discussed and illustrated in this article.

By HOWARD HALLAS
Nash-Kelvinator Corporation



THE propeller is a very important part of an airplane, because upon the propeller falls the burden of pulling the ship through the air and upon the efficiency of the propeller depends the pilot's ability to maneuver his plane in accordance with the need of the moment.

The first propellers were solid wood blades rigidly anchored to the hub, and

Fig. 1 — Drilling and reaming the eye hole in the shaft of the propeller blades using a 6-station Barnes Drilling Machine.

the propellers require a This attitude be in error the production engineering blades to be changed is in operation. In spite of this more propellers distortion as well as water spraying for the hub the blades are entangled with the governors, or built to order to an extent the hub machine. There are complete



Fig. 2—Contour-milling edges of propeller blade.

the propeller was calculated to require a minimum of engineering. This attitude was soon discovered to be in error; the modern propeller is the product of an infinite amount of engineering and is built with metal blades the pitch of which can be changed as required while the plane is in operation.

In spite of its increased cost, metal is more popular than wood for propellers due to its freedom from distortion as a result of weather variation as well as its freedom from splintering when hit with foliage, clods, or spray. Steel is ordinarily used for the hubs, with aluminum alloy for the blades. The variable pitch feature entails the use of bearings, governors, oil pumps, cams, and the accessory parts. The blades must be built to exact dimensions and twisted to an exact pitch and curvature, and the hub end of the blade must be machined to exact fit for the hub. There are 120 different parts in the complete propeller assembly.

The Hamilton Standard propeller blades manufactured by the Nash-Kelvinator Corporation's Propeller Division, at Lansing, Michigan, are hot forged from virgin aluminum alloy. The blade itself is solid. The blade is assembled and anchored to the spider hub by assembling two barrel halves at the end of the blade over two thrust races on the hub arm. The twist, better known as the "feathering," is generated in the blade by machining in a profiling machine, by the use of cam attachments.

One of the more interesting operations in the machining of the propeller blade is that of drilling and rough and finish reaming the taper hole in the shank end of the blade. This operation is performed in a special Barnes 6-spindle drilling machine, shown in operation in Fig. 1. The tools used in this operation are stub drills and taper reamers of special design, designed and manufactured especially for this job by the Pratt & Whitney Tool Division of the

Niles-Bement-Pond Company.

The machine has six stations, each equipped with a chuck in which the blade is clamped manually. Five of these stations are equipped with tools for machining the taper hole, the sixth station being the loading station. The operations performed by the six spindles are as follows:

No. 1 spindle; rough drill $2\frac{1}{2}$ -inch

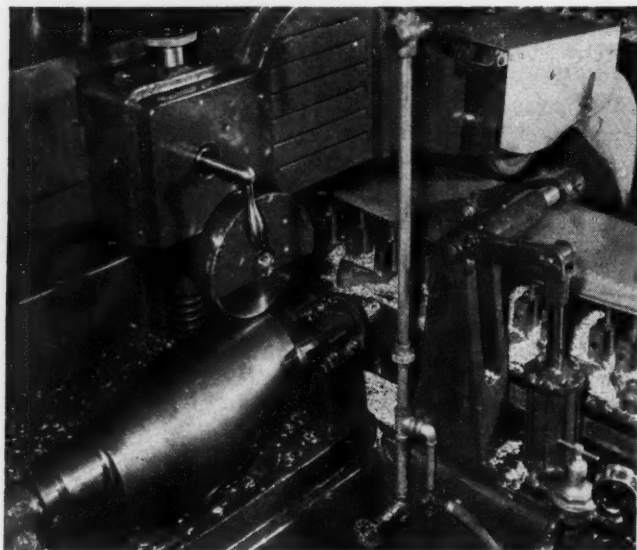


Fig. 3—Rough milling camber side of rough blade forging. The movement of the cutter is controlled by a cam wheel operating in conjunction with a cylindrical cam.

diameter in shank end of blade.

No. 2; rough bore taper in $2\frac{1}{2}$ -inch diameter hole and chamfer.

No. 3; rough tip drill.

No. 4; semi-finish ream hole to 3.220 inch.

No. 5; finish ream hole to 3.250 inch.

No. 6; loading station.

The taper in the hole is 2 inches per foot and the size of the finished hole at the maximum dimension is 3.250 inch with an allowance of 0.00025 inch of taper in six inches.

The operation shown in Fig. 2 is that of milling the edges of the propeller blade to the contour specified in the design. The machine is a special 2-spindle edge miller built for this job by Sundstrand Machine Tool Co. and designed so that the two spindles, one of which is directly above the other, can be moved vertically independent of each other so as to follow the specified design.

the special design.

Extending parallel with the workpiece is a master template "jacks" of the exact size and design required on the blade, and as the blade is fed between the two cutters, the template, simultaneously, passes between two loose rollers on the cutter spindles spreading the air and bringing them together again at the exact point to duplicate the design of the template in the machining of the blade. The

blades are forced apart by the template and are forced to converge again at the narrow part of the blade by the use of suspended deadweights on the spindle slides. Up to this point the blades are approximately flat and straight. Approximately $\frac{1}{4}$ inch of stock is removed from each edge of the blade depending upon the previous forging operation.

In the next operation the contour of the blade is roughed on the camber side of the rough blade forging.

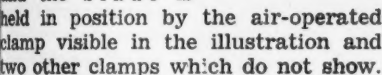
Fig. 4—The prop checked

this operation performed special shown in

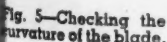
blade is from by a "jacks" be adjusted and design provide support on the parts of the blade, and the held in between the two clamp v two other plate, simultaneously. Here a cutter is between two loose cam rollers on the cutter a special in the lo spreading the air to hold the cutter p the blade the function design of the template. A traverse of the blade. The movement of the template the ta prede amount a cutter re As the seeds, the drical

Fig. 5—Curvature of

this operation being performed in the special machine shown in Fig. 3. The blade is supported from underneath by a series of "jacks" which can be adjusted to provide support at all parts of the blade, and the blade is



As the table
needs, the cylin-
drical template



November, 1942



Fig. 6—Using hydraulic inspection table to check final propeller assembly for oil leaks

proximately $\frac{1}{8}$ inch, depending upon the forging.

In Fig. 4 an inspector is shown in process of checking the contour of the propeller blade. The tools used for this operation are a heavy surface plate which is as long as the blade, a chuck at one end of the plate into which the blade can be chucked for the inspection operation, and a surface gage. A square is also used with which to set the scribe on the surface gage.

The chuck is so anchored to the surface plate that the propeller blade will be held exactly parallel with the surface of the plate. The plate is marked off to provide 24 ordinate stations at which points the blade is checked to the master blade template for camber and face. In other words, at each one of these 24 stations the surface gage scribe is set to a height which will correspond with the figures shown on the blueprint, and the blade is checked accordingly.

The curvature of the blade is given

in the drawing of the blade.

If the angle is not correct at any one of the 12 points, the blade is put into an Oil Gear twisting press where hydraulic pressure is applied to twist the blade to the required angle. Each blade must meet the designer's specifications as to angle throughout its entire length before it is oiled for use.

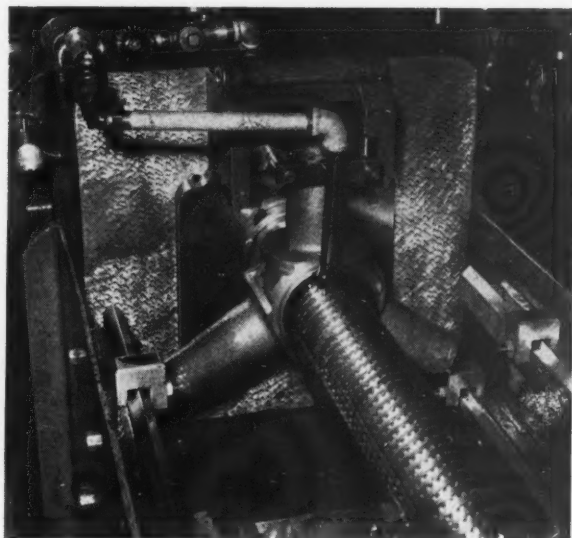
Another inspection operation on the propeller blade is shown in process in Fig. 6—that of checking the final assembly for oil leaks. After the blades have been assembled to the hub, the hub is set in position on the hydraulic inspection table and oil under high pressure for feathering and unfeathering the variable blade pitch, controlled by an automatic pressure valve, is forced in the hub. The hub must be oil tight; if any leaks develop, the blades and hub are disassembled and all parts are rechecked to discover the point of failure.

An important machining operation on the spider hub is shown in Fig. 7

a final check to the use of the bevel protractor and surface plate shown in Fig. 5. Checking at 12 different points in the length of the blade, the inspector sets the bevel protractor to the angle of the blade at each point and then notes whether or not this angle corresponds to the angle specified

broaching splines the hub is a La ing machine with 69 broaches each to 0.254 in. After the hub of the a size both perfect is performing

Fig. 7—Broaching drive splines in hub.



broaching the drive splines in the hole in the hub. The machine is a LaPointe broaching machine and the broach is 60 inches long with 69 teeth. Using this tool, 36 splines are broached in the hub, each to a depth of 0.254 inch. The tolerance on the finish diameter is 0.0015 inch.

After the hole through the axis of the hub has been finished, each one of the arms on the hub is ground to size both for symmetry and to achieve perfect static balance. This operation is performed in the Cincinnati grinding machine shown in Fig. 8.

In the finishing of the arms there are two bearing sizes which must be finished to very close limits to serve as fits for the blade bushing. In the illustration the operator is shown balancing a finished hub on static balancing ways to determine whether or not

the hub is in perfect balance. If not, he removes enough stock from the taper portion of the arm, between the bearings, so that the hub will remain in balance at any point on the balancing machine.



Fig. 8—The arms on the hub are ground to size both for symmetry and for balance. Perfect balance must be achieved to prevent the possibility of vibration in the finished propeller.



Fig. 9. — Inspecting the finished propeller hub.

The finished hub is inspected with the tools shown in use in Fig. 9. As shown, the hub is mounted between centers on a surface plate, a special arbor is inserted through the axis of the hub, and with this arbor in perfect horizontal position each arm is checked to make sure that it is finished to the desired 120-degree angle

amount of tolerance for variation from the perfect 120-degree angle.

Thus from the foregoing it is readily apparent that, in the fabrication of propellers for Uncle Sam's fighting ships of the air, nothing is left to chance in the Nash-Kelvinator plant so far as workmanship and accuracy are concerned.

How Thick Should a Brazed Joint Be?

When using ordinary soft solders and common base-metal brazing alloys, V-shaped joints of considerable thickness are often specified. But when brazing alloys containing substantial proportions of silver are used, it has been found that maximum strength results when the clearance which is filled with the alloy in brazing is only a few thousandths of an inch. In certain tests in brazing stainless steel, reported by the American Silver Producers' Research Project, it was found that a joint only 0.0015 in. thick gave maximum strength. Because of their extreme fluidity, silver brazing alloys penetrate into narrow openings and, if the joint is properly designed, it is usually as strong as or stronger than the metals brazed. The small amount of silver alloy required and the facility with

which a strong joint is effected, more than offset the cost of the silver employed.

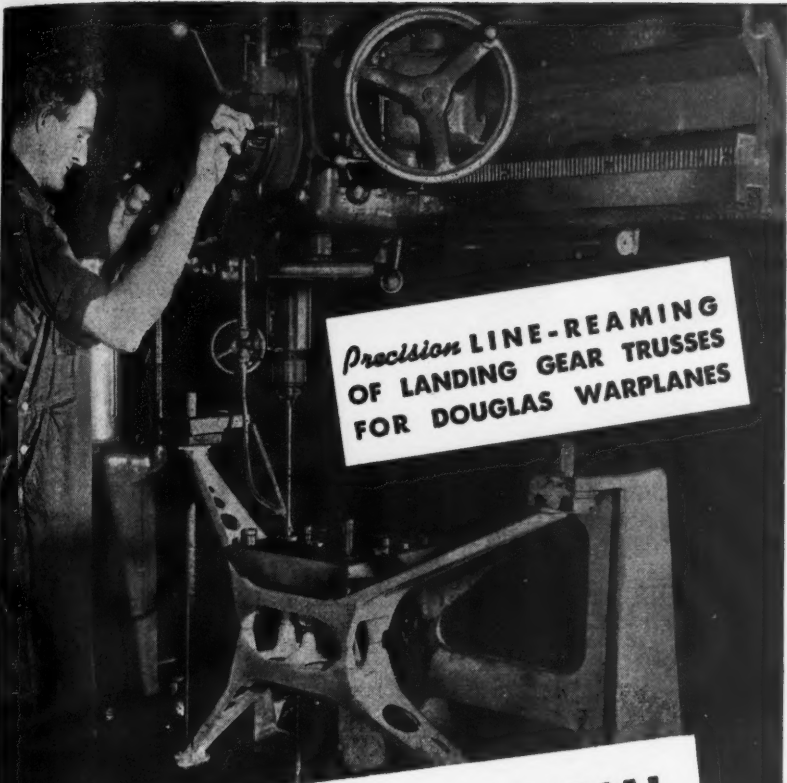
"Grits and Grinds," Vol. 33, No. 4. "How to Use Truing and Dressing Tools" is the title of a well illustrated and informative article which is one of the features of this particular edition of "Grits and Grinds," publication of the Norton Company, Worcester, Mass. The booklet also contains illustrations and descriptions on a Norton No. 35 Cylindrical Grinder in production in a Texas shop, a concave-convex radial truing device, and radial truing device for 6 x 18-inch surface grinder. Cartoons No. 6 and 7 of "One of the Grinding Line" are also included. Copy of "Grits and Grinds," Vol. 33, No. 4, free.

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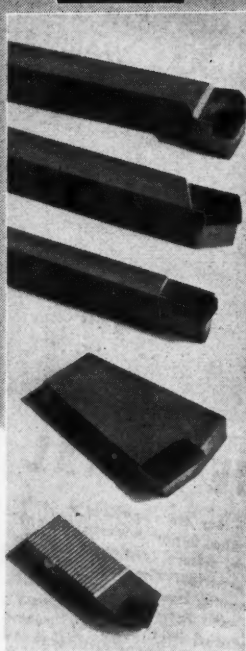


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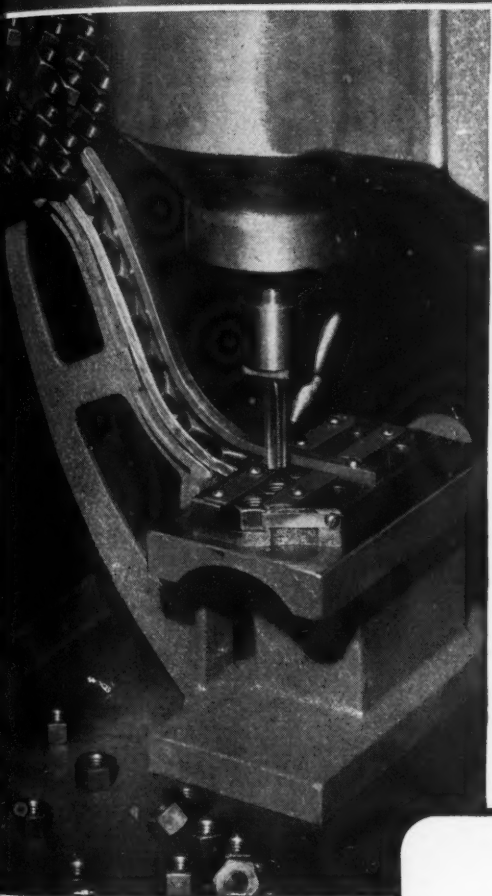
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Improvements in Nitriding Technique

At N. A. Woodworth Company Improve Quality and Reduce Processing Time and Costs

By GERALD ELDRIDGE STEDMAN

NEVER before have such functional demands been made upon metal as in this war of movement, power impact and speed. And nowhere is this fact more certainly evidenced than in the engineering and production of the aircraft engine.

The necessity to endure against turbulence, corrosions, friction, stresses, strains, gravitational pull, and chemical reactions is almost beyond belief. Particular wearing surfaces of certain aircraft engine parts require un-

conquerable strength, hardness and endurance. All of this constant, seething battle with its infinity of molecular strains has brought about many developments in metallurgical technique, including a little discussed but highly important process that has multiplied the qualities of contacting metal surfaces to resist wear. I refer to the nitriding process.

Without the availability of the nitriding process, there could be no aerial warfare as we now know it. Though too broad for technical detailing in anything less than an encyclopediac manner, a practical understanding of this process can be gained from the method used to produce the required qualities in the surface of a single, vital aircraft engine part. For an example, we are privileged to review the technique of the N. A. Woodworth Company,



President N. A. Woodworth and Metallurgist Williams of the N. A. Woodworth Company Examine a Propeller Shaft Thrust Bearing after It has Been Through the Heat Treating Process

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Loading the Rough Forgings into the Gas-Fired Hardening Furnace



Detroit, manufacturer of aircraft engine parts and other precision work.

The usual method of case hardening is by carburization. However, the use of this technique frequently causes warping and distortion, and often results in a surface hardness lower than the minimum that can be tolerated on the vital wearing surface of a propeller shaft thrust bearing spacer, for example. This part really has to take it.

During the first world war, or shortly thereafter, studies originated in Germany to determine the combining power of various alloying elements toward nitrogen and the resulting stability of such nitrided surfaces. Elements forming nitrided surfaces included manganese, chromium, vanadium, molybdenum, tungsten, titanium. Among these, aluminum ranked first in nitriding effectiveness. The evolution of these special alloyed steels, together with the development of the ammonia case hardening process, represents the most important metallurgical development of recent years. It has taken American technicians to bring it to present perfection. Nitriding is a patented process, the Nitrallo Corporation licensing its patent rights.

The ammonia case hardening proc-

ess known as nitriding involves the technique of subjecting machined and heat treated parts to an ammonia gas under controlled conditions to create remarkable surface hardness without further treatment. The resulting case has amazing wear-resisting properties. It retains this hardness at unusually high temperatures, and presents unique resistance to atmospheric, water and salt water corruptions. Without it no aircraft engine could perform under the stresses to which they are now submitted.

Careful investigation within the Detroit industrial picture indicates that aside from Commercial Steel Treating Corporation, who are specialists in tool hardening and heat treating on batch bases for many concerns, the N. A. Woodworth Company is the only war producer who maintains a commercial nitriding department. Woodworth has made phenomenal climb as an aircraft engine part producer, having now achieved quality precision on a production basis, and in fact, having accomplished the highest production per square

foot of factory space to be found in America. He was founder and until 1937 president of Detroit's Ex-Cell-O Corporation. Foreseeing the importance of aircraft engine production in war in 1939, he organized the N. A. Woodworth Company. The growth of his new firm has been without parallel, much of his success being credited to improvement of production techniques. His perfection of the nitriding process is, in itself, a worthy example of his prowess as an engineer.

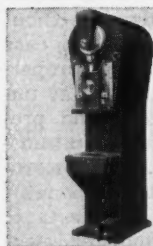
Though I want to avoid too much technical definition of the nitriding process, a little of it is necessary to understand the "why-how" of the Woodworth technique. In the nitriding process, it is the effect of ammonia gas decomposing on the surface of the alloyed steel in a controlled heat atmosphere that imparts the superior case hardening. This ammonia gas decomposes to a certain extent

into nitrogen and hydrogen, the reaction being $2\text{NH}_3 \rightleftharpoons 2\text{N} + 3\text{H}_2$.

Nitrogen is customarily inactive and inert but, in its nascent state, it is extremely reactive. This reaction must, therefore, be understood in relation to the nascent characteristic of its reaction under heat and in regard to the surface of the alloyed steel.

The catalytic breakdown of ammonia results in a molecular nitrogen. During the chemical decomposition, the nascent nitrogen combines to a certain extent with the alloying elements in the steel to form the nitrided case. These nitrides, which are in solid solution and in a fine state of dispersion throughout the case, impart extreme hardness to the surface of the steel, a hardness which gradually decreases inwardly until finally it corresponds to that of the core.

This catalytic phenomenon of nas-



Illustrated:

Ferracut Streamlined Punching Press PG3; Ferracut double-action Inclineable Press DDG2; Ferracut special-purpose, double-action Press SDG112.



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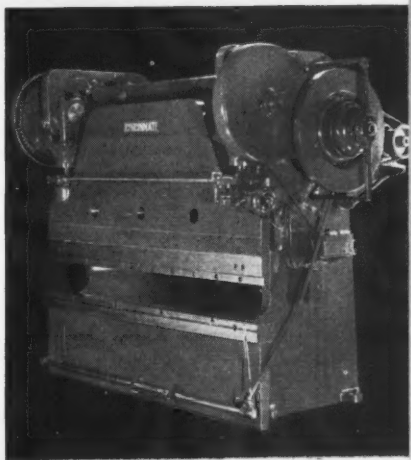


Performance on the production line must precede performance on the battle line.

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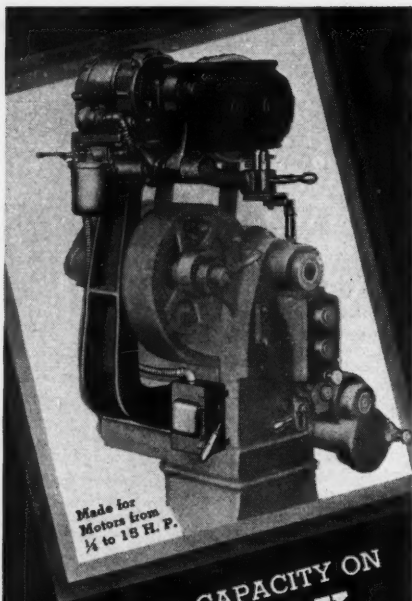
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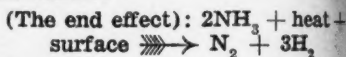
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gency isn't so generally recognized. For example, one can pump nitrogen gas through a furnace and nothing happens. It is the catalytic action of the ammonia decomposition on the surface of the alloyed steel at a controlled and uniform heat that encourages most effective capture of the nitrogen molecule and results in a hardened or "nitrided" surface. This is the phenomenon that Woodworth metallurgists have so deeply studied in the development of the superior nitriding technique which they are now using.

Perhaps the reaction of the nascent phenomenon could best be shown in this manner:



(accomplished by the nascent phenomenon)



Perhaps the most difficult nitriding job in the Woodworth plant is on this part known as the propeller shaft thrust bearing spacer. It has a wearing surface that takes the greatest conceivable punishment in power delivery. Multi-slotted with an approximate 10-inch o.d., this spacer requires 54 separate production operations.

From a rough starting weight of 18.25 lbs., it is machined down to a finish weight of 1.187 lbs. The material is nitrallo G, which analyses: carbon, 0.38-0.45; manganese, 0.40-0.70; aluminum, 0.95-1.35; chromium, 1.40-1.80; molybdenum, 0.30-0.45. It is the closed end surface and inside bearing radius of the spacer that receives nitriding.

The rough spacer forging, after careful inspection, is normalized at 1,800 deg. F. and air-cooled to remove all forging strain. The subsequent hardening operation in an open, gas-fired Standard Fuel and Engineering

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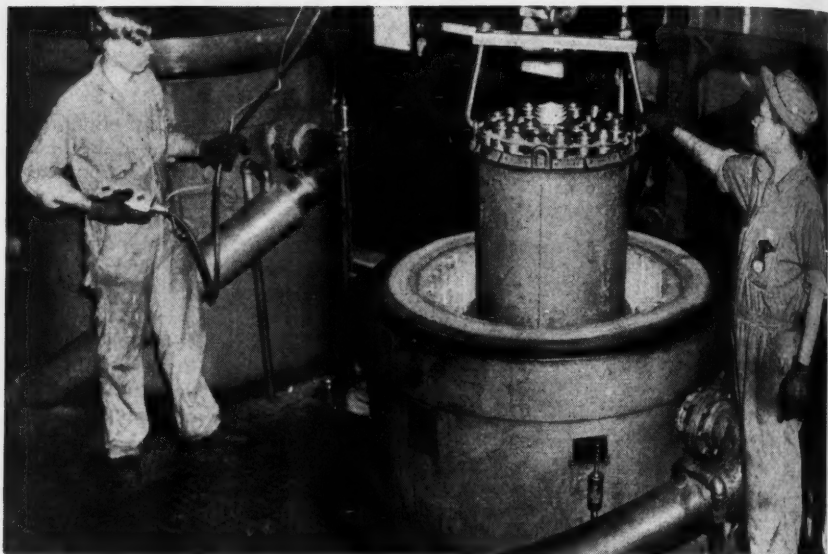
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furnace at between 1,700 deg. and 1,750 deg. F., stays at the high side to assure elimination of all free ferrite, making the job easier to machine. Heat-soaked until uniform, it is quenched in oil. The spacer is then drawn to machine range in a Leeds & Northrup Homodraw tempering furnace for three hours at approximately 1,180 deg. F. to produce a Brinnell reading of 290-302. Added to the essential physical qualities, this treatment develops a uniform sorbetic structure, which is easy to machine. After heat treating, the part is rotoblasted to remove all scale.

There then occurs a series of operations in which the spacer is machined, polished and burred, in the course of which it receives a continuity of exhaustive inspections before it is finally made ready for tinplating, preparatory to nitriding. It is tinplated in an alkali bath to obtain a 0.0002 to 0.0003 deposit. Tin electrolytes have

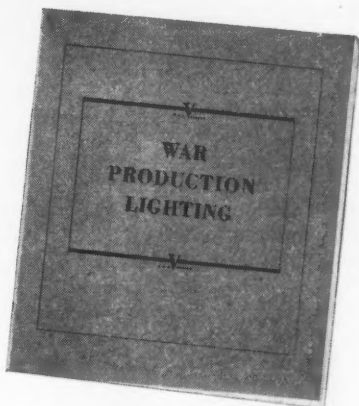
great throwing power, easily cover the inside surfaces, and adhere easily to the base metal. Tinplating provides best protection against nitriding of those areas that are to stay soft, or of those that should not be exposed to nitriding and its ensuing growth.

The tinplate is then removed from the surfaces to be case hardened by nitriding. Because of the complicated design of the part, this task involves a series of operations in which the tin is ground from the closed end and the slots are grooved to remove the tin. In the nitriding operation a certain amount of growth always occurs in which sharp corners build out, chip and break off as they cool. It is therefore essential to break the inside corners.

A slight growth occurs during any nitriding process. Allowances for this change can be pre-determined only by test runs to show deviation from re-

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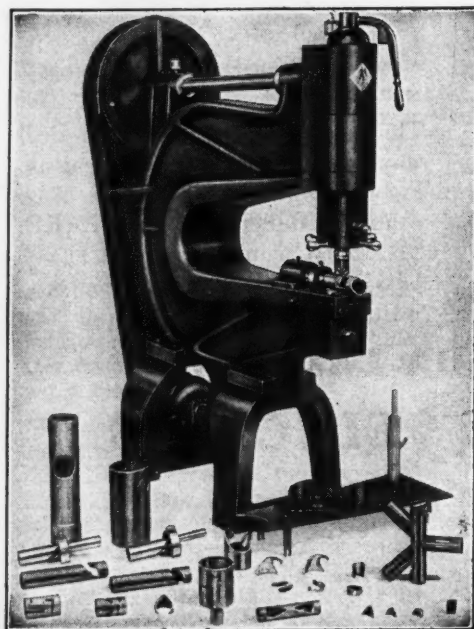
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quired shapes or sizes. No yardstick can be devised. However, this spacer has exceptionally close tolerances. Likewise, its relativity of surface dish and side slot dimensional effects plus its inside angle tangent to the radius (providing a 95 per cent bearing face which in assembly is fitted to a ball race) presented a neat problem in preserving its required precision by premeditating the growth. This problem was solved in that typical Woodworth fashion. Experiments, costly in time and money, were required to establish accurate procedure.

The closed end of the spacer is concave-dished three degrees. After nitriding, this surface, because of the growth, becomes a perfectly flat plane. However, this growth recovery effects the side slot so that an oversize allowance of 0.003 is made for it. After nitriding, this slot closes in, allowing the right amount of stock for finish size. The rings grooves (or slots) are

0.005 before nitriding and close up to 0.002 after nitriding. That is the way experimentation solved the difficult production problem, permitting the nitriding growth to be accurately premeditated and compensated for on the closed end and inside wearing radius of this spacer.

The Leeds & Northrup forced-circulation method of nitriding is used, which provides precise control of nitriding temperature, flow and distribution of ammonia gas and of the duration of treatment. The heat-treater can change any of these three variables, holding the rest constant. This makes possible systematic progress toward the case required. By holding all three variables constant, the required case can positively and uniformly be duplicated in batch after batch. As will be explained, this furnace floods every exposed surface of every piece with a uniform blast of ammonia gas, producing controlled



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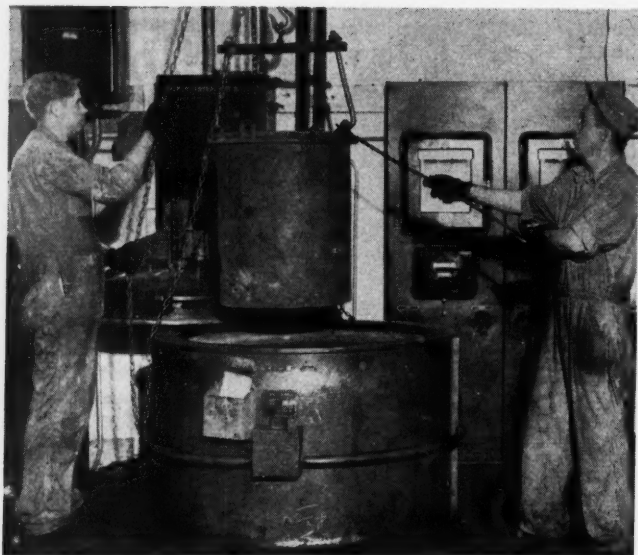
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dispersion at controlled temperatures. Nitrides therefore form evenly at a predictable rate, developing the intensely hard case characteristics that make the nitrided surface of this part so capable of taking the otherwise irresistible wear.

From 120 to 130 or these spacers are loaded into the furnace work-basket with the end face to be nitrided placed upward. They are packed in layers with a separating screen protected by special paint. Smaller parts are often packed in the large openings in the spacers, to conserve nitriding operations, but none are permitted to touch the tin plate. These nichrome work-baskets or pots into which these parts are placed are 22 inches diameter by 28 inches deep.

Since the tin becomes fluid at nitriding temperatures, a slight oil film is left on the parts to prevent the tinplate from running. With this oil film, the tinplate maintains its surface tension at the start and is kept from creeping. By the time the oil has burned off, the surface has be-

come nearly as smooth as those for copper plating, such as is used in selective carburization, in that the tin is fluid at working temperatures and consequently fills up pores better than copper.

The cylindrical furnace shell is gas tight. After the nichrome pot is swung into the furnace the lid is lowered into place, its skirted edge resting in an oil-filled trough and thus forming a gas-tight seal without the need of gaskets. The heat-treater then turns the control-setter of the Micro-max Recording Controller to the specified soak temperature, starts the flow of ammonia gas and turns on the fan. The ammonia gas flows into the furnace alternately from two inlets; one top, one bottom.

A powerful fan-motor circulates the nitriding gas. This is a direct-connected fan and motor assembly with but one moving part, rigidly anchored to the furnace, the fan shafts revolving in snug packing glands to prevent the escape of the gas. The high pressure developed at low r.p.m.

gun to be attached by ammonia gas and the tin does not creep.

The tendency of the tin to creep is further prevented by stacking the parts with the large diameter downward. Surfaces for tin plating need not

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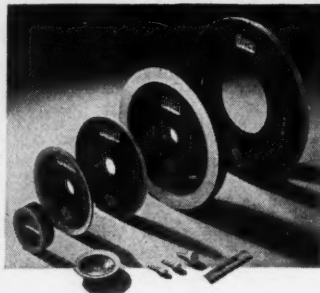
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creates practically no vibration and but negligible wear. Gland lubrication by alemite gun, occasional hoist oiling and maintenance of level in the lid sealing trough are the only service requirements.

The direction of fan rotation is automatically reversed at predetermined intervals of operation. Thus when the fan sweeps furnace atmosphere upward, fresh ammonia gas streams in at the top of the furnace and is pulled downward through the work. When the fan reverses to pull the furnace atmosphere upward around the work, fresh gas enters at the furnace bottom and is gently pushed up through the work.

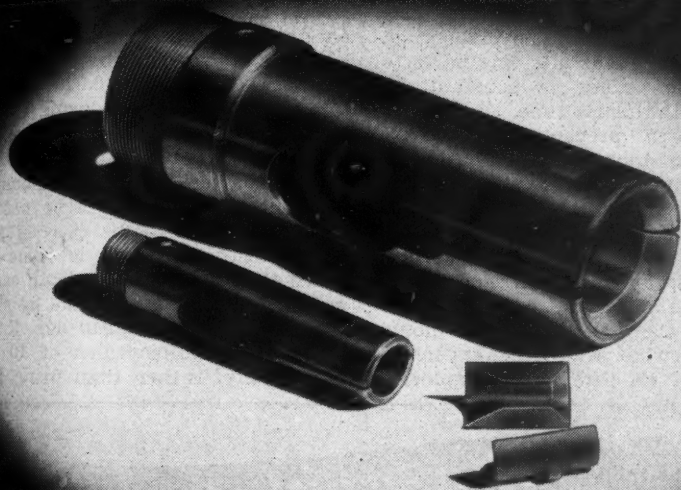
The furnace is run until an ammonia dissociation of 10 per cent is achieved, the heat-treater testing the air-gas ratio of the furnace atmosphere frequently by means of a convenient dissociation pipette. As soon as the proportion is suitable, the heat is turned on and the furnace is held at 975 deg. F. for 50 hours. The heat is then cut off and the furnace cooled down. The ammonia flow is slightly increased in this phase to prevent air being sucked into the furnace pot to discolor the load. A cool-down to 250 deg. F., requiring from five to ten hours depending on the load, is accomplished before removal. The fan continues running during this cool-down period.

The constantly-controlled gas flow guarantees an uniformity within 0.002 variation in case depth throughout the load. The uniformity of atmosphere is so dependable that the full load can be run just over the minimum with the assurance that if case depth is achieved in one, it has been achieved in all spots in the load. Thus in this plant nitriding is accomplished in 50 to 55 hours, whereas in many cases others require 90 hours to obtain the same case depth. Woodworth aims at a 0.019 inch case depth and

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consistently attains 0.020-0.022 inch.

The Micromax Control provides uniform temperature control. At any time during the heat the dissociation rate can be determined and the ammonia flow adjusted. The heat-treater can "see" the temperature at any instant on the bold scale of the Controller. The heat input can be reduced before the work reaches soaking temperature to prevent overshooting. Thus Woodworth is nitriding parts to exact specifications in substantially less than the usual time.

Woodworth prevents the breakdown of ammonia on such furnace parts as hinges, baskets and supports by cleaning and spraying them with a mixture of chrome oxide and sodium silicate. This coating lasts for several loads, is sprayed by gun, and is impervious to ammonia. A considerable saving is thereby effected, ammonia being somewhat scarce and expensive because of its demand by explosive

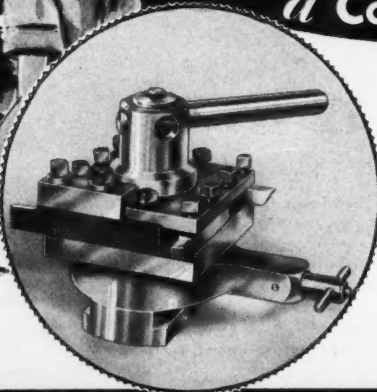
manufacture and other war chemical purposes.

Mr. Williams, N. A. Woodworth Company metallurgist, explains that he gets a nitriding case depth of 0.011-0.015 inch during the first 25 hours of heat, and at the end of the second 25 hours, a case depth of 0.020-0.022 inch materializes. In other words, the rate of depth decreases one-third the speed in the second 25 hours as is evidenced by the comparison between 0.015 and 0.020—an addition of but 0.005 inch during the latter period. There is ample premise to conclude that the catalysts become poisoned after a certain amount of use, but this poison can be neutralized by a slight temperature step-up.

For instance, there is some evidence that greater case depth can be gained within a given time by starting temperatures at 940 deg. F. and stepping up in rhythms of 10 deg. periodically, rather than firing from



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the start at 990 deg. Popularly, I presume, the point might be illustrated by saying that should one want to get a beefsteak fried to a certain depth within a specified time, it is best to start the firing at a lower temperature and increase it. To start at the highest temperature at the start would sear the steak and tend to retard the accomplishment of the case depth desired.

Quoting Mr. Williams: "There is reason to believe that the nitrallo G steel has a definite catalytic effect on the breakdown of the ammonia; therefore the rate of breakdown at the surface of the steel tends to decrease as the process goes on. This rate of breakdown could be again brought back to the initial speed by an increase of temperature.

We are experimenting on loads starting at the low point of 950 deg. F. and increasing the heat in steps. Runs made so far indicate a possi-

bility of obtaining greater case depth in a given number of hours by this method rather than if the load were run the same length of time at even heat, even though this even heat may be as high as the heat used for the last period in the step method. If an accurately measured flow of NH_3 is supplied to the furnace, the dissociation can be stepped up by slight increases in temperature as mentioned above."

After nitriding, the spacer wearing surface should Rockwell 15 N 92 minimum. All operations on the part after nitriding are grinding, the tin being left on the parts not ground.

Tests used during this series of operations are: (1) drop test for tin plate thickness, (2) Brinnell test for core hardness at the first heat treating, (3) superficial Rockwell to check case hardness, (4) polish and etch sample, using the Brinnell to measure case depth.

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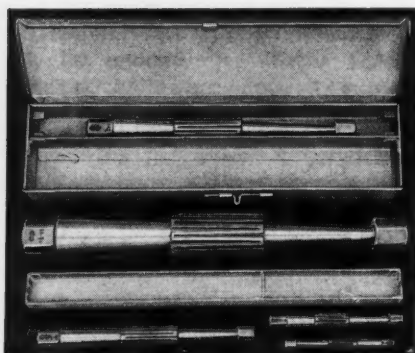
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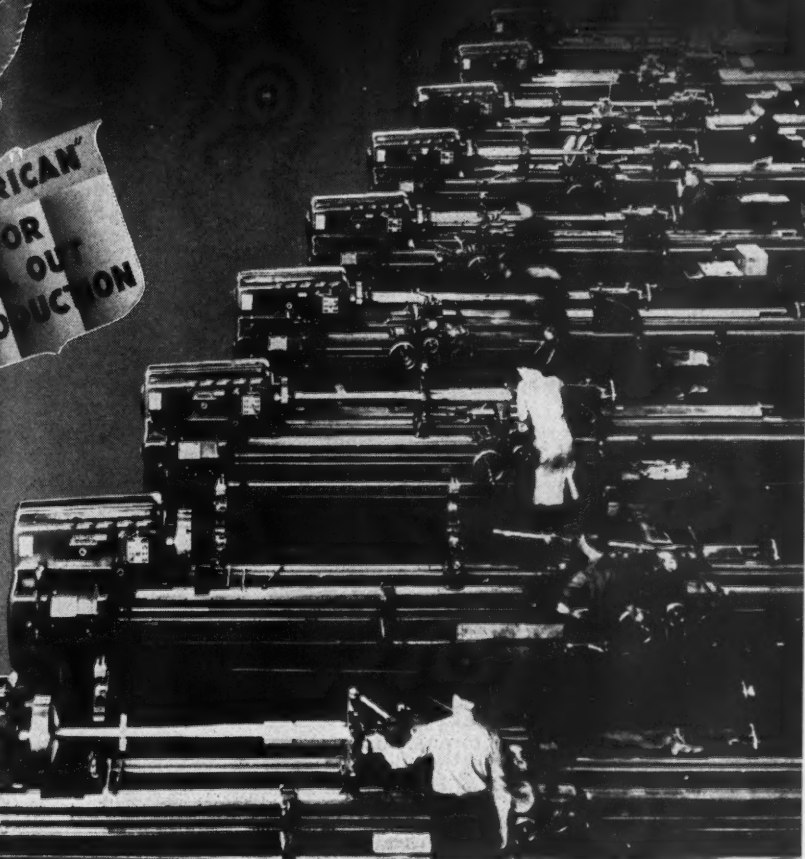
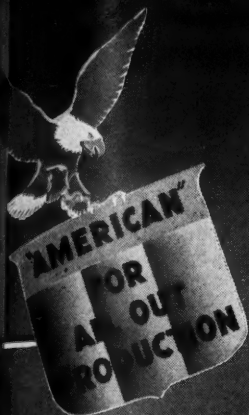
stresses and are, therefore, free from the aging effects which are important to gauges, crankshafts, and such aircraft engine parts as the spacer. They are rust-resisting to a very high degree.

Among the disadvantages of a high nitriding temperature, beside the decrease in surface hardness, there is evidence that there is an increased dissociation of the ammonia, causing liberation of more atomic hydrogen, a greater growth of nitriding and a greater tendency toward decarburization due to the action of the atomic hydrogen.

The important phases of consideration appear to be the influence of the surface condition of the steel, the means of protecting against nitriding, the effect of the amount of dissociation of the ammonia on the character of the case, the influence of time and temperature of nitriding on the depth of the case obtained, the feasibility of premeditating and compensating for nitriding growth, the importance of a uniformly circulated breakdown of ammonia gas, and the conservation of preventing alloy furnace parts to become nitrided. It is to be emphasized that all traces of decarburization and all strains must be eliminated before the subjection of parts to the nitriding process.

Never before have such demands been made upon metal to transfer movement, power and speed to war requirements. And as necessity is the mother of invention, so is war the provocator of technical advancement. The improvements in the arts of nitriding indicate that it will have profound metallurgical influence in the entire field of power both during the war and afterwards.

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It Can Happen Here - Hitler and Hirohito Win

By ERNEST W. FAIR

IMPERIAL GERMAN GOVERNMENT

Protectorate of America
WASHINGTON, D. C.

June 1, 1947.

General Order to All Machine Shop

Executives:

Heil Hitler!

In accordance with Der Fuehrer's plans of the New Order for all previously misguided American business men, we are herewith directing that the accompanying form giving information relative to your business be filed with this office immediately. Since the purpose of gathering all such information is to enable true Aryans everywhere to enjoy the full-est fruits of this life, we urge that you fill out in detail each of the 1,345 questions thereon. This office must have this information within three days.

Heil Hitler!

(Signed) Major Otto Hinkler,
In charge, Machine Shop Division.

JONES MACHINE SHOP

"Bringing Superior American Skill at
Nominal Prices"

JONESBORO, ARKANSAS

June 3, 1947.

Major Otto Hinkler,
Machine Shop Division,
Imperial German Government,
Washington, D. C.

Dear Major Hinkler:

We are returning herewith the form sent us filled out as completely as it

was possible for us to do so. In short period of time allotted to answer so many questions made impossible for us to go into as much detail as requested. However, we are sure that the information given in this form will satisfy the needs of your office.

Very truly yours,
Sam Jones, Manager

IMPERIAL GERMAN GOVERNMENT

Protectorate of America
WASHINGTON, D. C.

June 6, 1947

Mr. Sam Jones, Manager,
Jones Machine Shop,
Jonesboro, Ark.
Mr. Jones:

Heil Hitler!

Your partially completed form and letter received. This office is vexed at your incompetence and attention to detail as shown thereon.

We are herewith ordering you to fill out in detail the duplicate copy of said form which we are enclosing herewith. Also we have the following specific orders which must be carried out immediately:

(a) We note four of your employees (Cohen, Levine, Goldstein and Meyer) have names generally identified with a race that is abhorable to all true Aryans. If these named individuals are of whole or part Jewish extraction you will forward this

WATCH YOUR *Speed* AND *Feed!*

Tool Conservation Demands that the Rates be Right

When you are using properly designed and sharpened metal cutting tools, no factors of operating efficiency are more important than the selection of correct speeds and feed rates for each milling job.

Since proper selection is dependent on many variables, it is vital that *all* circumstances be considered. Such factors as the sharpness of the cutter, the proportions and depth of the cut to be made, the type and hardness of the work material, and the condition of the machine have their influence on the cutting operation.

Therefore, an intelligent analysis of cutting speeds and feeds on *each set-up* will be of great help in getting the most production and the longest life from your cutting tools.



ILLINOIS TOOL WORKS

MANUFACTURERS OF METAL CUTTING
TOOLS AND SHAKEPROOF PRODUCTS

2501 N. Keeler Avenue, Chicago, Illinois

In Canada: Canada, Illinois Tools, Ltd.
Toronto, Ontario

ILLINOIS

High Speed Production Tools

Hobs • Broaches • Shaper Cutters • Milling
Cutters • Ground Form Tools • Special Tools

Gear Measuring Machines

Gear Measuring Blocks

Die Filing Machines

formation immediately to your local Gestapo offices and proceed to acquire replacements from the membership rolls of the nearest German-American Bund.

(b) In your letter you neglected to properly express due respect for our great Leader and Benefactor, Adolph Hitler. You will in future open and close all of your letters (as well as personal greetings) with the salutation, "Heil Hitler."

(c) The advertising slogan used by your firm is offensive in that American skills were definitely shown to be inferior as a result of the war. You will immediately dispense with this slogan.

It is to your best interests and continued good health to see that these instructions are complied with immediately!

Heil Hitler!

Major Otto Hinkler,
In charge, Machine Shop Division.

JONES MACHINE SHOP
"Bringing Superior American Skill at
Nominal Prices"
JONESBORO, ARKANSAS

June 9, 1947.

Major Otto Hinkler,
Machine Shop Division,
Imperial German Government,
Washington, D. C.
Dear Major Hinkler:

Heil Hitler!

We are enclosing herewith the form again, this time fully filled out. It was necessary for us to hire four special agents of the Bund to do this. Strangely enough, they arrived the same day as your letter, saying they were aware I would need such help. These individuals were very offensive and vulgar and I am sure conducted themselves in a manner that would be displeasing to your office.

The four men you mentioned were of part Jewish extraction, although I

have never known them to even attend the Jewish church. However, it is unnecessary for me to write that they have been discharged, inasmuch as they disappeared the day before I received your letter and have not heard from them since.

In accordance with your direction I called the office of the Bund at Little Rock for four machinists to replace them. The men sent knew absolutely nothing about machine shop work and have only succeeded in completely wrecking the majority of my equipment that I have been forced to close shop until it can be replaced. If no machinists are available at Little Rock, will you please send some from another area.

We are crossing out the advertising slogan you dislike and will omit it on all future advertising. We still have 10,000 letterheads that we must use up but will cross this out on these, however.

Inasmuch as I have so promptly complied with your instructions, I trust that you will assist me in securing new employees who know something about machine work and also instruct your local Business Police office to give me permits to secure new equipment.

Very truly yours,
Sam Jones, Manager.

IMPERIAL GERMAN GOVERNMENT
Protectorate of America
WASHINGTON, D. C.

June 10, 1947.

Mr. Sam Jones, Manager,
Jones Machine Shop,
Jonesboro, Arkansas.
Mr. Jones:

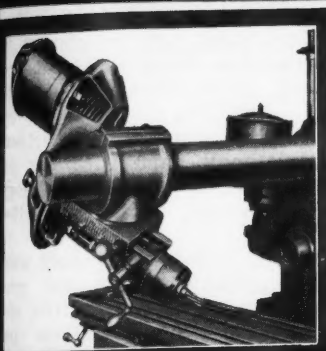
Heil Hitler!

Your complaints and requests have been duly noted. You are advised that any requests for permits must be accompanied by a check for \$1,000 as a contribution to the Party Culture

New HALCO UNIVERSAL HEAD

for High Speed
**MILLING, DRILLING, BOR-
ING and COUNTER BORING**

Five Speeds 350 to 2900 R.P.M. Also
10 speeds 125 to 2900 R.P.M. available
at extra cost.

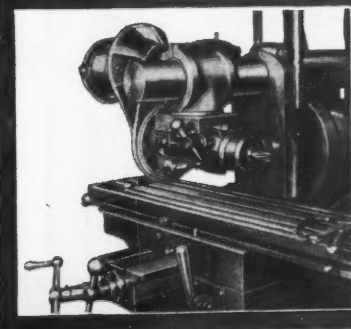
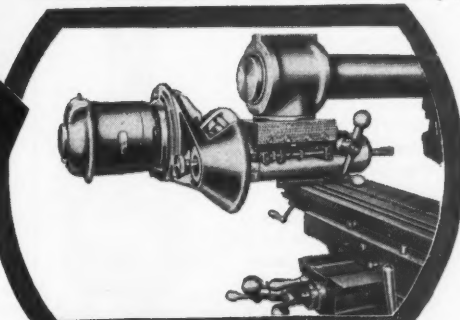


FOR HIGH SPEED
MILLING, DRILLING, BORING ON ANY ANGLE
AND COUNTER BORING

THE Halco Hi-Speed Universal Milling Attachment has proven its importance in building tools, dies, jigs, fixtures, wood and metal patterns and other machine products. Its 4-inch vertical travel permits many milling, boring and facing operations in one setup, a factor of convenience to which is added the advantage that the unit can be easily mounted by one man, it weighing only 90 pounds. Each head is unconditionally guaranteed for six months.

DEFINITE DELIVERY

(Designers and Builders of Fine Machine Tools)



SEND TODAY FOR FOLDER

AJAX ENGINEERING & MFG. CO.

MANUFACTURERS OF HALCO PRODUCTS

14230 BIRWOOD AVE.,

DETROIT, MICH.

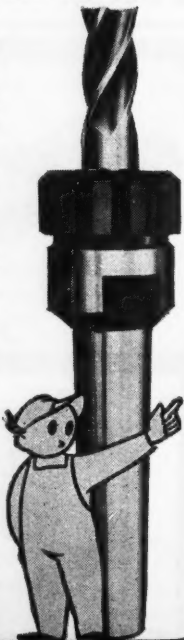


UNIVERSAL FIRST COMPANY IN AMERICA TO WIN COV- ETED 20% BOND FLAG

When each of the 550 of us here at Universal helped give the Allied cause a boost by being America's first industrial plant to subscribe 20% for War Bonds we were mighty proud.

But we're even more proud of the big volume of precision built collet chucks we're turning out daily to help America's arms production.

The Universal collet chuck shown here has ground threads, ample room for tool feed out and is ideal for holding end mills, keyway cutters, drills, etc. Write for facts.



UNIVERSAL
ENGINEERING COMPANY
FRANKENMUTH, MICH.

Fund, of which by a happy coincidence I am one of the national directors. When this has been done you may forward the receipt you will receive from the local party office and your requests will be given attention.

We are sure you must have been mistaken about the actions of the Bund men; no Bund member is ever anything but a true Aryan gentleman.

Discard all letterheads, advertising etc., you may have with the previously referred to offensive slogans printed thereon; do not use them hereafter.

Also you failed after ample warning to properly salute our great Leader and Benefactor at the close of your letter. Saluting at the opening is not enough. You will remit a fine of \$100 to the party cultural fund headquarters here in Washington for this offense.

Heil Hitler!

Major Otto Hinkler,
In charge, Machine Shop Division

JONES MACHINE SHOP
"Superior German Mechanical Skills"
JONESBORO, ARKANSAS

June 13, 1947.

Major Otto Hinkler,
Machine Shop Division,
Imperial German Government,
Washington, D. C.
Dear Major Hinkler:

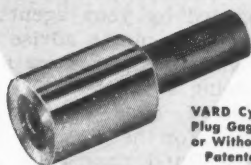
Heil Hitler!

Enclosed find my check for \$1,000 for the party fund and receipt for check for \$1,000 as a local contribution. Please forward orders immediately for repairs to my shop and secure new equipment and experienced machinists so that I may be open for business.

You will note our new letterhead which we secured from the Bund Party Shop at the exorbitant cost of \$



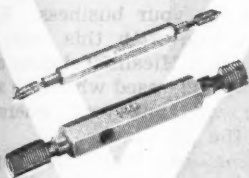
VARD Ball Thread Snap Gage—A quality Production Inspection Tool built in sizes from No. 0 to 12-in. diameters.



VARD Cylindrical Plug Gages—With or Without Special Patented Pilot.



Made in a complete range of sizes from 1/8-in. to 6-in. diameters. X, Y, and Z tolerances.



VARD Threaded Plug Gages—Made in all National and Metric thread forms and many special pitches.



VARD Threaded Plug Gages—Made in sizes from No. 0 to 6-in. diameters.

*Vard Gages are Accurate,
Easy to use and
have long Life*

These three qualities are found in all VARD gages. Accuracy is the end product of fine production machinery, skilled craftsmen and careful manufacturing control. Ease of Use comes through correct design—and we have a proving ground in our own large shops turning out precision aircraft ordnance and naval parts. Each type of VARD gage gets months of "use test" before it goes on the market. Long Life is the result of correct design and high quality steel. Here too VARD compensating adjustments on some types of gages prolongs service life.

Most VARD gages when worn through use may be returned to our factory for reconditioning. Such VARD reconditioned gages are as accurate as new gages.

VARD INC.
PASADENA, CALIFORNIA

per thousand. The new slogan was suggested by your agents here who called upon me to advise me of this change and assessed me a fee of \$25 for doing so.

Also I have another complaint query. For the past two days agents of the Bund have been making inquiries of my friends as to whether or not I was of Jewish blood. Permit me to inform you that this is not so and that such investigations are ab-

olutely unnecessary.

May I have immediate action on the orders for new equipment and supplying of new machinists so that I may reopen my shop?

Heil Hitler!

IMPERIAL GERMAN GOVERNMENT

Protectorate of America
WASHINGTON, D. C.

June 14, 1947.

To Sam Jones,
Jonesboro, Ark.

Heil Hitler!

Your continued complaints and inability to get your shop open immediately have forced us to appoint a manager for your business. He will report to you with this order. His name is Hon. Hiesho Tokeoko and he is to be so addressed whenever spoken to. You will take your orders from him for the time being.

I am enclosing herewith a duplicate copy of a report from the director of the Youth Division of the Bund at Little Rock, stating his investigations reveal your great-great-grandfather on your mother's side was of one-sixteenth Jewish blood. For your own sake I hope that this is not so. You are permitted to offer evidence to the contrary at any time within the next 48 hours.

Heil Hitler!

Major Otto Hinkler,
In charge, Machine Shop Division

THE TOKEOKO MACHINE SHOP
"Superior German and Japanese
Mechanical Skills"
JONESBORO, ARKANSAS


June 19, 1947.

Hon. Major Otto Hinkler,
Machine Shop Division,
Imperial German Government,
Washington, D. C.

Hon. Aryan Major:

Heil Hitler and Hirohito!

As your excellency will be pleased



Cut Set-Up Time
75% through use of the
New Advance Clamps
(the only T-slot clamps)
Clamp directly over
work. For use on all
machines with T-slots.
Standard and Heavy-
Duty type.

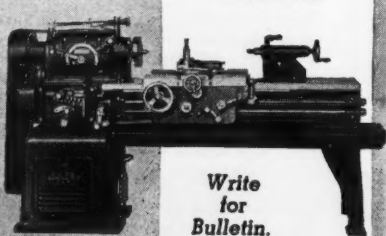
Write for circulars.

ADVANCE MACHINE WORKS
3727 Weissner Park Fort Wayne, Indiana

**CARROLL
AND
JAMIESON
LATHES
15" AND 16"**

**12 Speed Geared
Head Motor Drive
Timken Mounted
Spindle.**

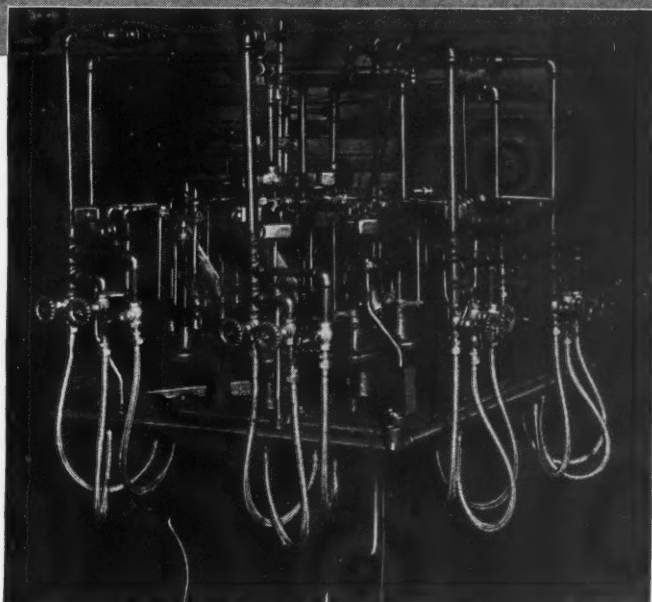
**Modern Design—
Liberal
Dimensions**



Write
for
Bulletin.

**THE CARROLL & JAMIESON
MACHINE TOOL CO.**
BATAVIA OHIO U.S.A.

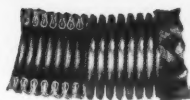
It has fought corrosion, high pressure and abrasion . . . and now fights "BACKFIRES" as well



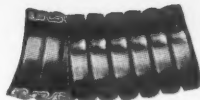
1947. Bead-rolling machine with air, gas and oxygen lines of durable American Seamless Flexible Metal Tubing. Photo courtesy of Kahle Engineering Co.

Frequent backfiring in the air, gas and oxygen lines on bead-rolling machines like the one above could seriously interfere with transmitter tube production . . . if the lines were not of American Seamless Flexible Metal Tubing.

Less rugged materials would burst, creating fire hazards as well as interrupting work. The purpose of the machine is to put an air-tight glass seal on filaments for transmitter tubes widely used in subs and planes. Oxygen flows through the American Seamless lines at a maximum pressure of 10 p.s.i., the gas at 1 p.s.i. and the air at 5 p.s.i.



American Seamless—corrugated from seamless rigid tubing...no welds, laps or joints . . . made in several alloys.



American Interlocked—wound of strip metal, joints packed; the toughest type of extremely flexible metal hose.

This is typical of the contributions which American Seamless and its companion American Metal Hose products are making to our war effort. They are serving in all types of connecting and conveying duties...for vibration control, for the correction of misalignment and for wiring conduit.

42205A

American Metal Hose

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn. Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ontario

to note, I have taken over the management and operation of this firm and am proceeding in most thorough manner as per your word-of-mouth instruction to making this situation an example of true Aryan culture and efficiency.

Have turned local machinists' union leader over to local Gestapo when same individual attempted to halt new labor plan for workers this shop. New plan calls for \$1 week spending

money with generous New Order providing food and lodging. So sorry but forced to shoot two machinists who object. Others say satisfied now work good 18 hours a day.

Also have Sam Jones, former manager this firm, arrested by Gestapo. Jones fail address this Aryan with proper respect and when given reprimand say very bad things about Hon. Hitler and Hon. Hirohito. Probably protest of non-Jewish ancestry mere bluff; undoubtedly Jones guilty.

Heil Hitler and Hirohito!

Hiesho Tokeoko, Manager.

From The German-Japanese Machine Journal (formerly Modern Machine Shop), issue of August, 1941


OBITUARY

Sam Jones, 56, at one time head of the Jones Machine Shop in Jonesboro, Ark., died there in the Physical Development Camp last week following collapse from unknown causes. The Jones shop is now the Tokeoko Machine Shop, one of the most outstanding of Aryan business institutions in the American Colonies. It is most capably managed by Hon. Hiesho Tokeoko, who was appointed to the position by the General Staff in charge of the machine shop industry, after Jones' repeated failures to operate the business satisfactorily. Hon. Tokeoko's efficient management is a true demonstration of the superior Aryan abilities in the business world and deserves the highest commendations. Jones was buried at the Culture Cemetery in true New Order-fashion without the ancient religious ceremonies requested by his wife and children. The latter are now serving six-month terms in labor camps for making such a foolish request.

Heil Hitler and Hirohito!



For Machine and Tool Work and Quick Set-Ups
 The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading. Price \$5.00 Plus Postage. Write for folder. Priority Rating Required.
J. R. REICH MFG. CO.
 45 E. Stroop Rd. Dayton, Ohio



The
"HOUSE OF PRECISION"
 ★
 Jansson Gage Blocks—a good standard for precision measurement. Used by leading armaments manufacturers. Preferred by experienced inspectors for their extreme accuracy.
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JANSSON GAGE COMPANY
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Kempsmith Millers have what it takes for today's grim battle of production . . . built-in ruggedness . . . increased range of speeds and feeds . . . greater power.

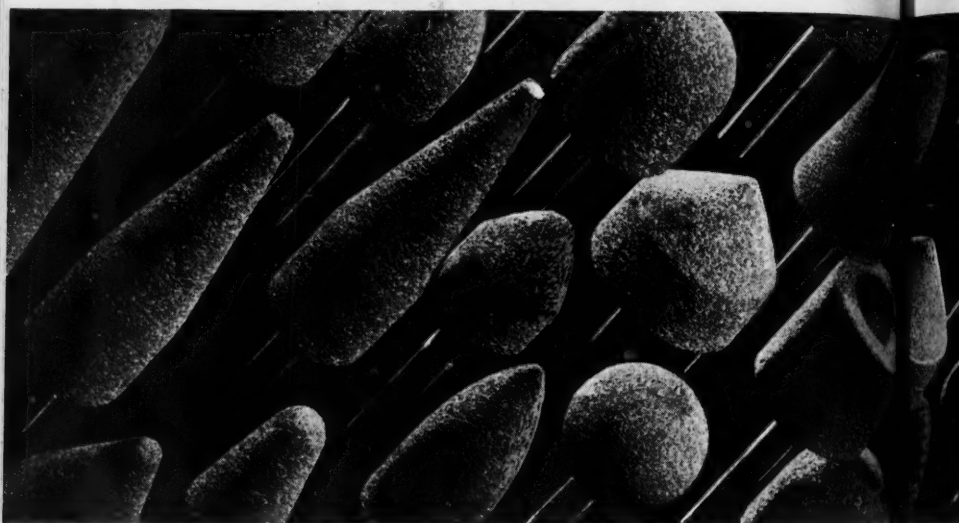
KEMPSMITH MACHINE CO.
MILWAUKEE, WIS., U. S. A.

KEMPSMITH

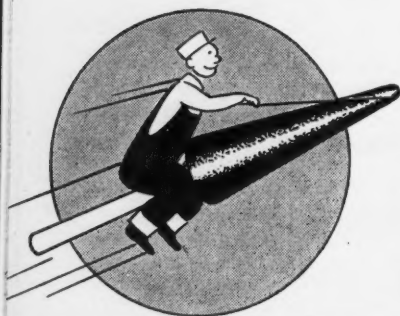
Precision Built Milling Machines Since 1888.

umber, 19

POLISH 'EM OFF



CHICAGO MOUNTED WHEELS — the result of 45 years of **KNOW HOW** — come in a wide range of styles on different size shanks, for use with any portable or flexible shaft grinder. Several special-formula abrasives give 150% to 300% longer service. More than 200 shapes, all mounted and rarin' to go.



TEST WHEEL FREE

If you have a grinding problem, send for Survey blank, which you'll find easy to fill out. Upon its return, our abrasive engineers will analyze it and send you without charge the trial wheel they recommend for your particular job.

LATEST CATALOG—Packed full of comprehensive information and pictures. You'll be interested. Send for copy.

MM-11

☐ Send Hi-Power ☐ Catalog

☐ Free Wheel. Size _____

Name _____

Address _____

CHICAGO WHEEL & MFG. CO.

Makers of Quality Products Since 1894

1101 W. Monroe St., Dept. MM, Chicago

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HI-PO

Here's
tool—a
enough
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17,000
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They're TOUGH and DO their STUFF!

E E
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Commandos of the grinding wheel industry—the first small wheels mounted on steel shanks and leading the way today with smoother, more rapid grinding, polishing and finishing of difficult jobs.

compa
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HI-POWER GRINDER

G. C
e 1894
Chicag
Corp.

Here's a real production tool—a 3-pounder with enough power to drive a 2½" diameter wheel. 17,000 r.p.m. In case with accessories, \$38.50.



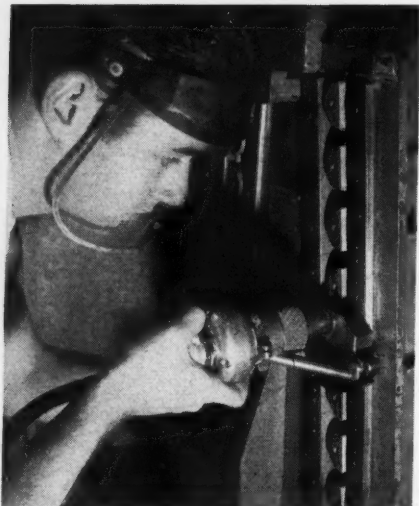


Fig. 1—Facing the Surface of a P-38 Bomber Wing Fitting, Using an Air-Operated Portable High Speed Milling Tool

AMERICA'S heavy bomber program has been stepped up at the Vega Aircraft Corporation plant in Burbank, California, by making a study of each task with a view to simplifying the labor involved, using properly-designed tools and fixtures, and eliminating lost motion. In other words, Vega engineers plan to "make every move count."

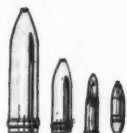
Each job is studied to determine whether an operator can work at the task most efficiently and with the least accumulated fatigue over a working period by standing or sitting at the task. If the arm movements involved in the task are comparatively short and the parts are light, provision is made for the worker to sit at the job. If the job can be expedited by holding the work in a fixture which will leave the operator's hands free, a motion study is made and a special fixture is designed to fit the job. If hand labor can be saved by the application of power, power is brought to the job.

Good Tool Planning Speeds Vega Aircraft Production

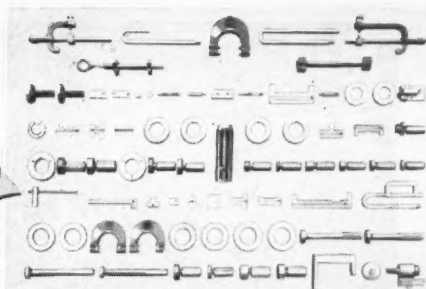
In the illustration Fig. 1 one of the Vega workmen is using a high speed milling tool, especially designed for this job, to face the surface of a "Lightning" P-38 wing fitting. This operation can only be done after the fitting is assembled in place, consequently it is impossible to have the operation performed by machine. Long guides are set up on each side of the corrugated fitting, to which a bracket is applied upon which is mounted a 50,000 r.p.m. air-driven Onsrud motor carrying an end-milling tool.

Scores of women are now counted the workers at the Vega plant, both on the day and the night shifts. In many cases the women perform precision operations and detail assembly jobs much better than men, for the reason that they have more nimble fingers and can more quickly adapt themselves to the handling of small parts.

A line of Vega girls is shown in Fig. 2 at work soldering pre-numbered wires into plugs for the assembly of "harnesses" or conduit-covered wires used in the electrical system of a B-17F "Flying Fortress." Each terminat-



**YOU CAN INSPECT
PROJECTILES AND SHELL
CASES THIS WAY •**



Checking each dimension separately and laboriously with its own fixed size gage requires many inspectors

and lots of time. This set of gages was used in checking the critical dimensions of a 75 mm. shrapnel body.

But

**HERE'S A BETTER And
A FASTER METHOD**

This Multicheck gage checks both tolerance limits on eight critical shell dimensions simultaneously—at just one pass and far more accurately than with fixed size gages.

In just one operation this gage checks the overall length of a cartridge case, two body diameters, one flange diameter, one shoulder height, one flange thickness, one counter-bore diameter, one counter-bore depth, and the primer hole diameter.



Write for a
Descriptive Bulletin on the
SHEFFIELD MULTICHECK GAGE

THE SHEFFIELD

C O R P O R A T I O N

DAYTON, OHIO, U. S. A.





Fig. 2 — Vega Girl Workers Soldering Pre-Numbered Wires into Plugs for the Assembly of the Electrical System of a B17F "Flying Fortress." The Plug is Held in a Special Fixture Into Which it is Clamped by a Single Turn of a Hand Screw, and the Fixture is Adjusted as Required by a Single Turn of a Locking Screw

tion in the plug is numbered to correspond to the number of the wire that is to be assembled to it. Each girl has a certain series of numbered wires to attach to the plug before it is passed on to the next worker. After all the

sembly inspected, a flexible casing or conduit is slipped over the wires and fastened in place. The final inspection is then made for workmanship and the finished harness is ready to be installed in the junction box.

wires have been soldered into the plugs and the as-



Flexoid Speed Control units

*are helping to STEP UP
production of MACHINE TOOLS*

3 STANDARD 4 SPEED MODELS
STANDARD 8 SPEED MODELS

1 TO 15 HORSEPOWER

4 Speed Ratios 3-1
8 Speed Ratios 7½-1

MANUFACTURERS of machine tools who are already successfully incorporating these sturdy ready-made gear boxes into their products, are enabled to divert critical labor and materials to other channels, thereby increasing their output, so necessary to win the war.

Our engineers are ready and anxious to demonstrate to all makers of SHAPERS, PLANERS, MILLERS, BORING MILLS, etc., the efficiency and surprising economy of Flexoid Speed Control Units.

Correspondence  is invited

1545 E. 23rd St., THE *Smith* POWER TRANSMISSION CO. Cleveland, Ohio



WELDON ROBERTS

Brightboy

REG. U.S. PAT. OFF.

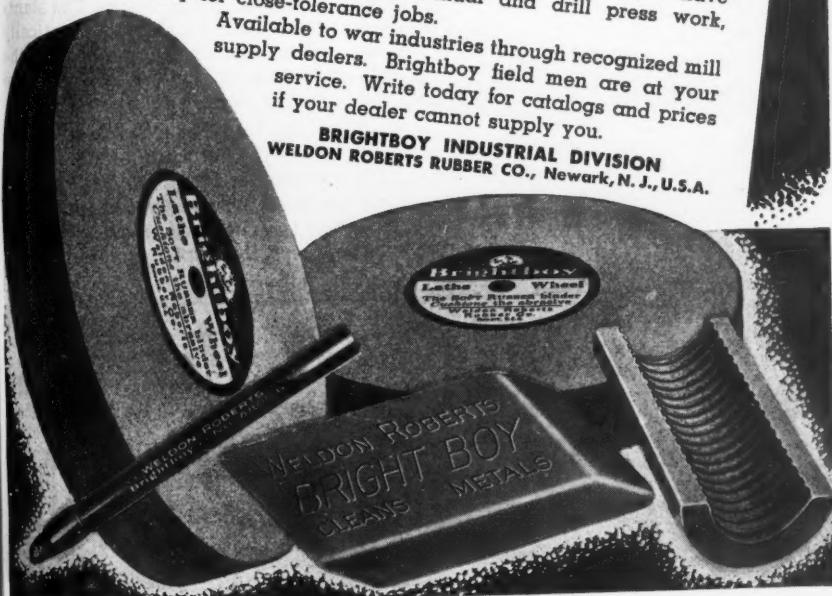
"The Soft Rubber Binder Cushions The Abrasive"

A NEW HIGH for FINISHING SPEED

FINISHING speed-ups, frequently combining a number of operations are being achieved by BRIGHTBOY. Brightboy bridges the gap between a grind and a buff. Because its abrasive is rubber cushioned, it produces a finish at substantial savings in operation and labor. Works on all metals — alclad, dural, aluminum, steel, copper, brass. Brightboy wheels can de-burr, polish and put on a slight radius in one operation. Brightboy blocks and special shapes have innumerable applications for manual and drill press work, especially for close-tolerance jobs.

Available to war industries through recognized mill supply dealers. Brightboy field men are at your service. Write today for catalogs and prices if your dealer cannot supply you.

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO., Newark, N. J., U.S.A.



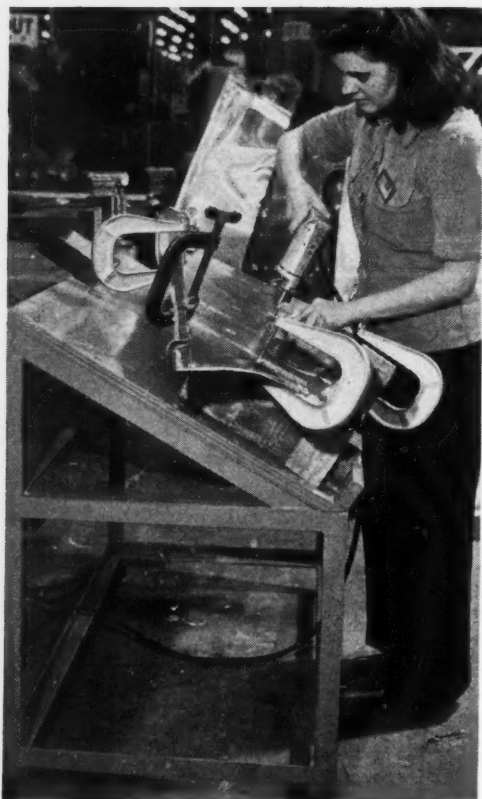


Fig. 3—Drilling Small Holes in a Sheet Metal Part for a Plane, Using a Portable Drill and Slip Bushing. The Slanting Table Was Designed to Eliminate Fatigue Due to Stretching Over a Flat Top Table

that is made by Vega engineers to conserve the energy of the workers through the elimination of fatigue. In this illustration the worker — Jessie Baldwin of the shearing, routing, and forming department—is using a portable electric drill to drill a series of holes in a sheet metal part. The workpiece is held by clamps to a sheet metal templet, the whole job resting on a special slanted drilling table. Previously the job was done on an ordinary flat-top workbench which required the operator to lean over in an unnatural position in order to reach the holes on the opposite side of the work. The slant-top table eliminates practically all of the bending and brings the far side of the work within range of the operator's eyes.

bomber's panel, instrument panel, or other electrical unit of which the harness is to become a part.

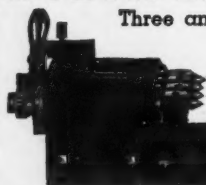
The slanted drilling table shown in Fig. 3 is a good example of the effort

An additional interesting feature of the job shown in process in Fig. 3 is the manner in which the drill bushing is held. Obviously it is not good practice to drill through drilled holes in a sheet metal templet; yet a separate

THIRTY YEARS EXPERIENCE MANUFACTURING MULTIPLE SPINDLE INDEX CENTERS

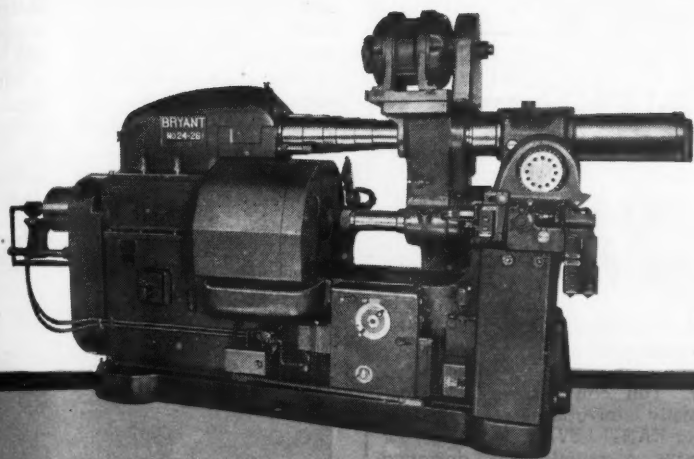
Three and four spindles of various types and sizes.

Write for circular.



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482 Canal St.
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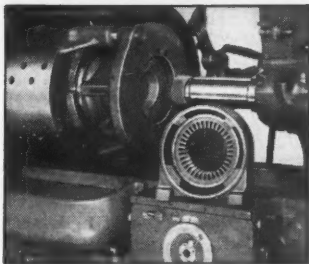
GRINDING MOTOR STATORS on the BRYANT No. 24-26

ELECTRIC motor manufacturers are relying on Bryant Internal Grinders for the precision and continuous production so vital to security today.

Precision is obtained by means of the Bryant principle of overhead wheel slide suspension—high production is maintained through single lever control features, automatic sizing, and simplified means of chucking.

Continuity of production is due to fundamental design and quality of materials and workmanship in Bryant Grinders. The Bryant No. 24-26, shown here, is equipped with a side loading type chuck. The motor stator is side clamped by means of an air cylinder.

Bryant is ready to serve you with greatly enlarged plant capacity and the knowledge gained by solving thousands of internal grinding jobs.



BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VERMONT, U. S. A.

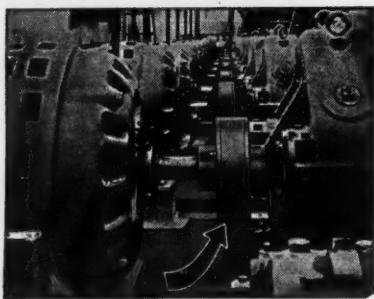
USE KANTI-LEVER COUPLINGS

THEY HELP YOU Maintain Peak Production

With your machines now forced to the limit to gain peak output, the necessity of stopping for repairs becomes much greater. You can prevent many of these costly interruptions of production by using KANTI-LEVER Couplings, for they have a scientifically designed Cushion Torque that absorbs sudden load shock and torsional vibration—the two main causes of wear, fatigue and failure of machinery. The KANTI-LEVER is different from any other type and gives your machinery a protection that is vitally needed under present abnormal conditions. See cut showing 70 KANTI-LEVERS that have proved invaluable to their user by protecting the driven machines and enabling steady production for over 18 years.

Send for Bulletin No. 28-M Describing

Kanti-lever Couplings



BROWN
ENGINEERING CO. 120 N. THIRD ST.
READING, PA.

hardened steel bushing for each of the many holes in the templet would be a considerable expense. So each hole in the templet is machined accurately, but oversize, and since all the holes are of the same size, a single slip bushing is used in all holes.

To simplify the task of inserting and removing the bushing from each of the



Fig. 4—The Use of a Hardened and Ground Steel Slip Bushing with Attached Handle Eliminates the Need for Bushings for Every Hole in the Templet, But Makes it Easy to Move the Bushing from One Hole to the Next

holes, a sheet metal handle is anchored to the bushing in such manner that the operator can hold onto the handle while the drilling operation is in progress. When finished, it is a simple matter to raise the hand, which also raises the bushing, and move it to the next hole. A close-up view of the bushing and handle is shown in Fig. 4.

CROSS ^{No. 20} UNIVERSAL

Milling Machine

with CUTTER SPINDLE ADJUSTABLE to **ANY ANGLE**

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ in **ANY PLANE** ★

Most milling operations are quickly finished with the No. 20 Cross because it is flexible and handles easily.

Self-contained coolant system with motorized centrifugal pump mounted on tank in the base.

A wide variety of operations, ranging from heavy duty production to sensitive tool room work, are all handled with equal ease on the No. 20 Cross Universal Milling Machine.

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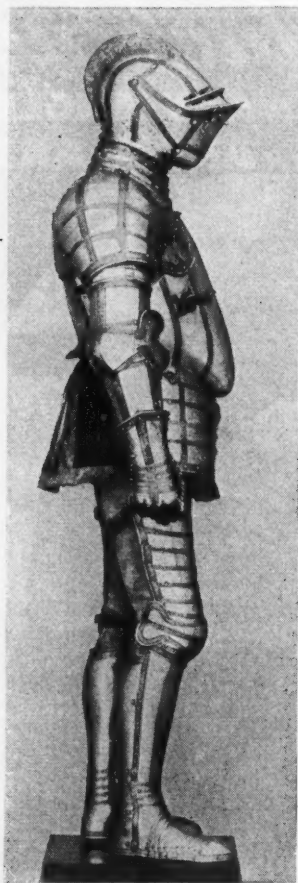
CROSS GEAR & MACHINE CO.

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DETROIT, MICHIGAN, U.S.A.

Beat Your Plowshares Into Swords, And Your Pruning Hooks Into Spears.

—JOEL III, 10



English Armor (about 1585) at
The Metropolitan
Museum of Art,
New York

In our Nation today all workers in metal, whether engaged in the metallurgical or the mechanical phase of production, are heavily engaged in making the "materiel" of war.

The job is to manufacture enough of what is wanted by army, navy, marine and air fighters and to make it of a quality worthy of those men, so we may enhance their effectiveness and avoid unduly risking their lives.

The quality of armor, in days of old, was proven or tested by vigorous and practical means though not by instruments—but *it was tested* and if it passed the test it was considered "armor-of-proof" and ready for battle.

Our company has the job of providing means to reliably and expeditiously test, for hardness, war materiel of today—not shields and suits of armor, but parts of aircraft, tanks, rifles and much other equipment, to see that it is all "armor-of-proof."

**"ROCKWELL"
HARDNESS TESTER**

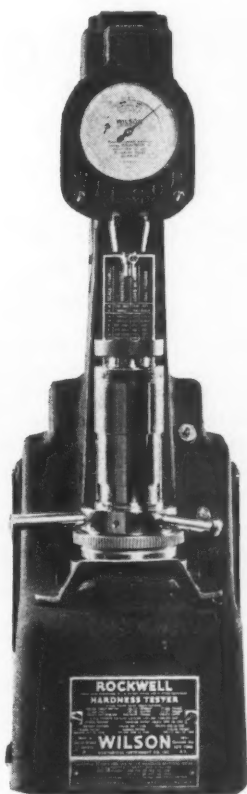
Concord Ave.

Here Is a Suggestion To Users of "Rockwell" Hardness Testers

Understanding of the value of hardness testing is not in everyone's mind, notwithstanding the realization of its prime importance by those who specify that the tests be made.

Select for operators those who can realize the importance and confidential character of testing. Give them a few moments of your time and explain what an important and ancient custom they are carrying out in a modern way. Under great pressure for production, and where carelessness may leave no visible sign or indication and where the "proof" of test may affect lives of those in our armed forces, there is a duty on the part of supervising authority to give thought to the exceptional importance of such tests and to do everything possible to insure their reliability and thoroughness.

If we have made the testing equipment properly and you use it properly, the United States will have "armor-of-proof."



"ROCKWELL" Hardness Tester—One of many types and sizes we make

WILSON
MECHANICAL INSTRUMENT CO. INC.

MODERN MACHINE SHOP 159

New York

November, 1942

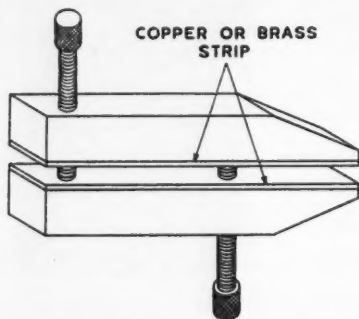


IDEAS FROM READERS

Prevent Marring Delicate Work

By A. H. WAYCHOFF

COPPER "jaws" fitted to the steel jaws of a vise or toolmakers' clamp will serve the purpose when delicate work must be held for finishing or assembling, but such jaws often become distorted in use. Copper facings on the vise-jaws elimi-



Copper Strips Sweated to Clamp Jaws Will Hold Delicate Work Without Injury

nate frequent refitting and serve the purpose much more efficiently.

To apply copper facings, it is necessary to first clean the face of each jaw, then tin with solder. Then cut strips of copper to the size required and tin them in the same manner. With the strips tinned well, lay them in place on the jaws and screw the

jaws together tightly. Then heat the jaws carefully just to the melting point of the solder, removing the heat-source immediately and allowing the jaws to cool.

If the job is done carefully the strips will be sweated to the clamp-jaws without injuring the temper of the jaws. The clamp or vise can then be used to hold fine or delicate work without the danger of injuring the piece. Further, the copper jaws will always be in place, eliminating the work of finding them when wanted.

Cutting Multi-Start Screws

By E. JAMES
England

WHEN multi-start* screws are to be cut, it is essential that each fresh start shall be spaced correctly from that previously cut. A common method of accomplishing this is to first select a driving gear with teeth of a number which is exactly divisible by the number of starts required on the screw to be cut. This can, of course, be done only on a lathe having "loose change" gears. If a gear box is provided on the lathe for screw cutting, this method of indexing the job from one start to the next cannot be used, nor can it be used if it is impossible to select a driver with

* English term for multi-thread.

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ber, 1942 November, 1942



"24 hours a day, 7 days a week for the past 4 years"

"Have been cutting 3" sq. to 10" sq. slugs to lengths of from 3" to 15 inches, 24 hours a day, 7 days a week for the past 4 years and have been doing a very good job," reports this eastern forge company.

Faster-cutting than any other hack saws, these MARVEL 9A and 6A "Automatic" Saws are built for continuous heavy duty operation, with all moving parts operating on ball-bearings and with automatic bar push up, they require no more operating attention than an automatic screw machine.

The complete MARVEL line provides efficient metal-cutting saws that are exactly suited to the needs of every shop.

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MARVEL SAWS

FASTER
Smoother
STRAIGHTER

CUTTING



These CATSKILL Abrasive Cut-Off Machines are cutting gear blanks, unannealed stock, tubing, extruded bars, cylinders, high carbon steel, pipe, etc.—without a secondary finishing operation. Solids to 2" and tubing and shapes to 3".

Cutting wheel runs in a slotted pipe through which coolant is pumped. This prevents surface hardening, burn and burr, and insures a smooth finished cut.

Write for folder.

CATSKILL METAL WORKS, Inc.

Manufacturing Engineers

CATSKILL

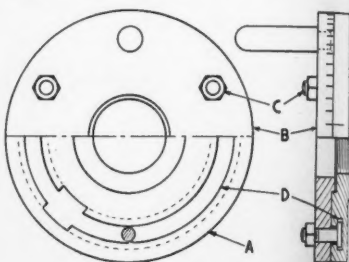
NEW YORK

teeth of a number just divisible by the number of starts.

This method of dividing the work does not involve indexing the work in the usual manner.

To facilitate matters, the half-nuts are engaged with the leadscrew while the carriage is moved back into contact with the tailstock. The first start (thread) is then cut in the ordinary way.

To cut the next thread, the carriage is moved back to the original starting point and the tool is moved,



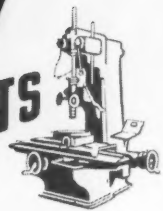
Drawing of Catch-Plate for Indexing Starts Multi-Thread Screws

means of the toolslide, a distance equal to the pitch of the screw being cut. When the half-nuts are engaged a new thread will be cut one pitch away from the thread previously cut. This procedure is repeated for each new start, the tool always being moved by moving the toolslide in the same direction.

Another method consists in cutting all of the threads simultaneously. This is done by setting up, in the toolholder, as many tools as there are threads to be cut. The tools are set up carefully one pitch apart so that each begins cutting at the correct distance behind the previous one. This method can, however, only be employed when the leading tools can move on through and out of the work to allow the following tools to complete their full threads.

An indexing catch-plate consisting of

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a very useful accessory for the lathe, a device of this nature being shown in the accompanying illustration. The back-plate (faceplate) **A** is counter-bored at center to a shallow depth and small diameter to take a corresponding shoulder turned on the rear of the indexing plate **B**. (The English term for this is "spigoting.") The catch-plate is locked to the faceplate by the three bolts **C**, and can be locked in any position of angular adjustment. The heads of the bolts ride in an annular tee-slot in the faceplate, as shown at **D**.

The periphery of the catch-plate is graduated in 60 equal divisions to co-act with corresponding with an index graduation on the periphery of the faceplate. To index a screw from one start to the next, the catch-plate is revolved a number of divisions equal to 60 divided by the number of starts, and since the 60 divisions are exactly divisible by 2, 3, 4, 5 and 6,

the plate is suitable for cutting screws having starts equal to the numbers—which includes the majority.

Removal of Broken Stud Bolts by Welding

By A. F. DAVIS

Vice President, Lincoln Electric Company

IN industrial maintenance work a problem of removing broken bolts is frequently encountered. This time-consuming operation usually involves work by a machinist, but New York welders have developed a method by which the broken bolts can be removed in about 1/20th the usual time, by use of the electric arc process of welding.

The method ordinarily used by machinists involves the drilling of the



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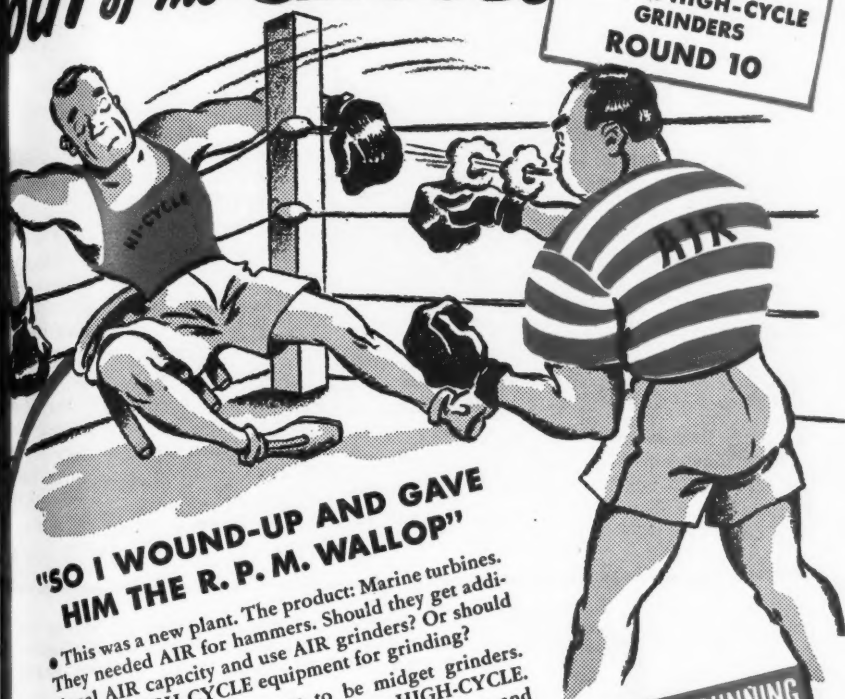
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OUT of the O'TOOLS

10 ROUNDS—
AIR VS. HIGH-CYCLE
GRINDERS
ROUND 10



"SO I WOUND-UP AND GAVE HIM THE R. P. M. WALLOP"

• This was a new plant. The product: Marine turbines. They needed AIR for hammers. Should they get additional AIR capacity and use AIR grinders? Or should they get HIGH-CYCLE equipment for grinding?

Many of the tools were to be midget grinders. That's where AIR usually has it over HIGH-CYCLE. The tools weigh only a pound and two ounces and run at 20,000 R.P.M.—half the weight and twice the speed of the HIGH-CYCLE grinders.

So, in this Round 10, AIR got the decision and 77 Rotor AIR Grinders went to work.

How's *your* portable tool production? Call in the Rotor Analyst for maintenance tips that will help win the war! He has valuable suggestions and aids to make your tools produce more and last longer.

This wall chart is part of the Rotor Tool Conservation Plan. Aids for maintenance of AIR and HIGH-CYCLE tools free on request.



THE ROTOR TOOL CO.

CLEVELAND, OHIO

HIGH CYCLE

AIR



BASED ANALYSIS OF PORTABLE TOOL PROBLEMS

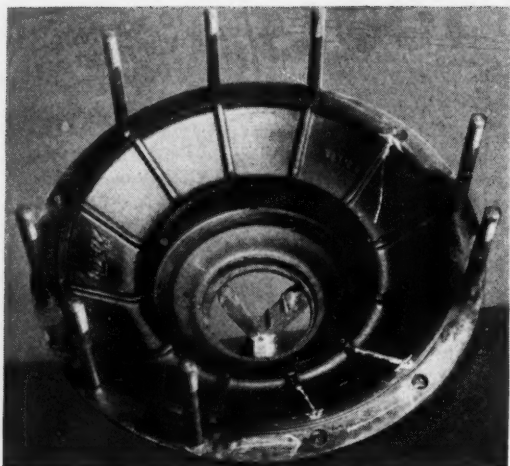
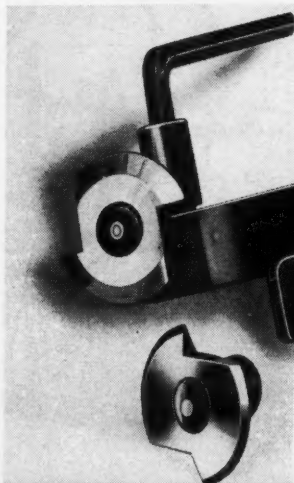


Fig. 1 — Maintenance machinists can remove broken stud bolts when they're given the tip of removing broken stud bolts. It's easy for the arc welder.

stud with a small drill, following this with a larger drill to remove as much of the stud bolt as possible without touching the threads, and then breaking out the remaining thin shell with

a small tool. The hole used must be re-tapped, adding fourth operation.

To proceed with the welding method, lay a nut about the broken stud. The inside diameter of the nut should be slightly larger than the outside diameter of the stud bolt. Build the stud up with weld metal, using the electric arc. Weld it to the nut. You now have a bolt with a regular head which may be removed with an ordinary wrench. In some cases a frozen stud bolt will require heating the area surrounding the bolt to



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NO PLACE FOR

"Doubtful Screws"

On Machines that Must Win the War!

Machines that turn out war equipment, must be built to withstand terrific production-pressure. Machinery builders can't afford to take chances with "doubtful" materials . . . faults might cause serious production set-backs. Every integral part must conform to rigid, predetermined standards—and that is why Parker-Kalon Quality-Controlled Socket Screws are in the preferred list of many famous makers of production equipment!

P-K Socket Screws meet every test for physical and mechanical characteristics. "Doubtful screws"—screws that look all right but some which fail to work right—are eliminated by careful check-routine supervised by Parker-Kalon's Quality-Control Laboratory. Such selection is especially important throughout industry today—yet, it costs no more to specify Parker-Kalon! Parker-Kalon Corp., 198 Varick Street, New York, N. Y.

"Quality-Controlled" means

Complete test and inspection covering: Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Tension and Shear; Hardness; Head diameter, height and concentricity; Socket shape, size, depth and centrality; and Thread fit.

PARKER-KALON
Quality-Controlled
SOCKET SCREWS

Give the Green Light to War Assemblies

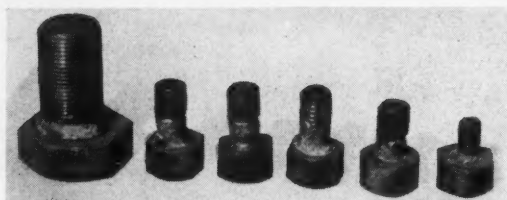


Fig. 2—Nuts welded on the broken studs do the trick. Here are six of the problems solved by means of the electric arc—at 20 times the speed.

pand the metal and permit the bolt to be removed. Often the welding operation itself will heat the area sufficiently to permit the removal of the stud as easily as an ordinary nut.

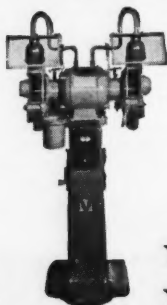
A typical broken stud problem is shown in Figure 1. When the hardened studs are broken off level, a machinist will take about an hour to remove the bolt by drilling. If the stud is broken off on an angle, the machinist must take much longer because the drills will break, or "run," on the slanted part of the stud.

The method described above per-

mits removal of an average of broken studs per hour, whether not they are broken off on an angle. A typical group of studs removed by the welding method is shown in Figure 2.

The method described permits the return of broken parts to service much sooner and in maintenance work conceivably could save a company thousands of dollars in production time. The method also eliminates what otherwise might prove a serious bottleneck in the National War Effort.

**TODAY . . . and
TOMORROW!**



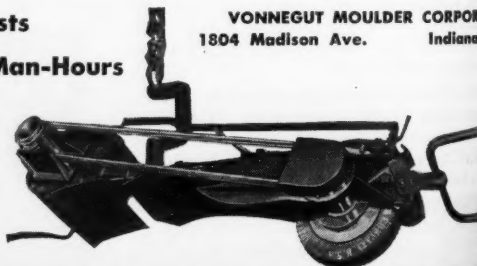
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All eighteen features that contribute to grinder and buffer efficiency are yours with a MARSCHKE. You want the fastest metal removal per hour at the lowest possible cost of abrasive. The controlled wheel speeds and smooth wheel rotation for which long-life Marschke Grinders are noted means **BEST RESULTS** on all jobs. Select the model designed for your job and your savings will pay for it quickly. Write for the complete Marschke Catalog—

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★ **Save Man-Hours**

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BUFFERS



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Many jobs on arbor presses, air chucks, riveters, air vises, cylinders, and other pneumatic machinery can be handled better at less than line pressure. Lots of jobs can be cut to half the ordinary line pressure; different jobs on the same machine can be handled faster and more accurately if proper adjustment for each job is simple and easy. Look over your air operated equipment with this in mind. Dependable pressure regulating valves, instantly adjustable to furnish the correct working pressure for each job, can help you get the most out of the air power now available, improve production, perhaps

avoid additional compressor investment.

Hannifin Pressure Regulating Valves give you an exclusive piston-type design that provides large volumetric capacity and sensitive, accurate control of working pressure. Adjustment can be made over the entire working range to deliver any reduced operating pressure desired. Construction is simple, for long, dependable service without maintenance.

Three standard sizes— $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ inch, for use on initial pressures up to 150 lbs. Furnished complete with pressure gauge. Write for Bulletin 56-MM.

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FROM THE SAME PORT
Regardless of
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Shaft Rotation

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Without the use of check valves, Tuthill Automatic Reversing Pumps deliver from the same port regardless of direction of shaft rotation. This exclusive feature in these positive displacement, internal-gear rotary pumps solves the problem of driving a pump from a reversing shaft without changing the flow of the pumpage. It also provides the answer where the ultimate direction of shaft rotation is not known. Sizes from 1 to 50 g.p.m. and pressure to 100 p.s.i. Available with or without relieving feature. Also in stripped model form.

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 Reversing Pump bulletin

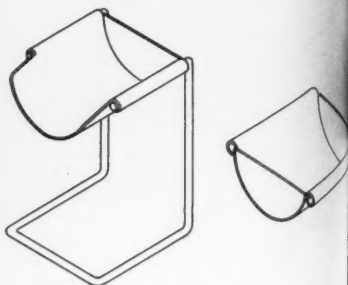
Tuthill PUMP COMPANY
 939 EAST 95TH STREET • Chicago

Handy Parts Container

By CHAS. H. WILLEY

IN an effort to simplify the task of handling small parts at the assembly bench we discovered that handy parts containers can be made from empty 15-gallon steel drums. The reader's comment might be "So the steel." And that's exactly what it will do—save steel and time.

The drums are cut into sections



Handy Parts Container Made from a Discarded Steel Drum and a Section of Steel Tubing

then the edges are rolled as shown in the drawing, both for safe handling and to aid in moving the containers about on the bench. A strap to hold the container at the desired height can easily and quickly be made from steel tubing.

Worker's Suggestion Doubles Production

EXPANDING production of heat-treated rivets by more than 100 per cent is the production short-cut idea submitted and put into operation at Consolidated Aircraft Corporation by Howard F. Watkins, leadman.

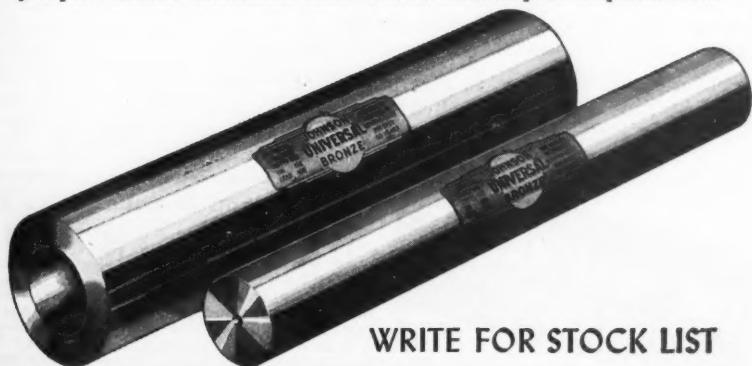
Watkins' idea, which brought an award of \$500 in cash and bonds from Consolidated, involved designing a standard Rotary Rivet

JOHNSON
BRONZE

Mountains of Metal

that could help WIN the WAR

Every time you purchase Bearing Bronze in the "rough," you buy at least 25% more metal than necessary. Quality bearing bronze contains copper, tin and lead . . . metals that are vital to our war effort. When your purchases amount to tons, you actually remove mountains of metal from the active market. You can easily avoid this waste . . . get a higher quality product . . . save many hours of machine time by specifying Johnson UNIVERSAL Bronze. Every Johnson bar is completely machined—I.D.—O.D.—ENDS. Our range of over 350 stock sizes enables you to buy according to your needs. Why not start today to help conserve metal? Your local Johnson Distributor can give you excellent service. His name will be found in your telephone book.



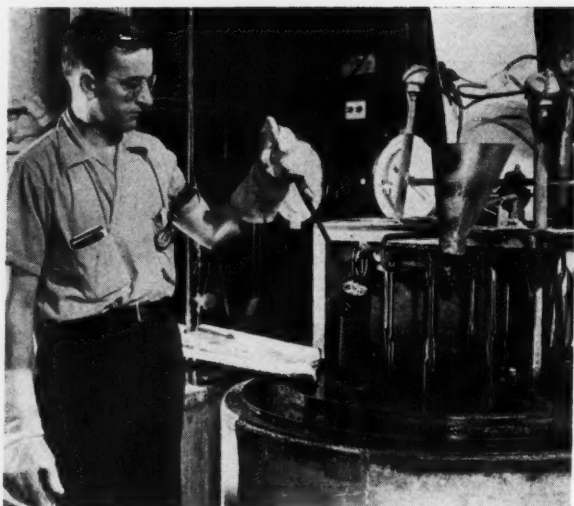
WRITE FOR STOCK LIST

JOHNSON BRONZE CO.

Sleeve BEARING HEADQUARTERS

590 S. MILL STREET • NEW CASTLE, PA.





Howard F. Watkins, a man at Consolidated Aircraft Corporation's San Diego Plant, Holding One of Additional Baskets Which Has Increased Production of Heat-Treated Rivets More Than 100 Per Cent

clares, urging war industry employees everywhere to do their part in winning the war by producing to the best of their ability.

Furnace. This redesigning involved the spider assembly from which rivet baskets are suspended, with the addition of 12 more baskets to the normal dozen, thus doubling the capacity of each operation.

Removal of a post and plate from the standard furnace was necessary to hold the additional arms and baskets, and it was discovered that potential heating capacity was sufficient.

"There's not a person in this plant who can't do his or her job a little better or a little faster," Watkins de-

"That Occasional Spring" Discussion

Mr. Howard Campbell,
Editor, MODERN MACHINE SHOP

Dear Sir:

This letter will acknowledge receipt of yours enclosing a letter from a correspondent who is connected with a Pacific Coast shop in which he referred to my recent article "The Occasional Spring" (Sept., 1942) and said, "I have occasion to make springs, but how to get the ends of

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Salvage defective castings . . . save "hard-to-get" parts . . . speed-up production of tools and fabricated parts . . . with this new welding development. CASTOLIN binds without melting the base metal. This means high strength, matching color. It means less stress, less warping, less preheating.

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Learn about Welding's Greatest Achievement. Write on firm letterhead for 36 page book "Low Temperature Welding".

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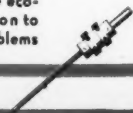
Removes burrs from inside and outside edges as fast as parts can be handled!



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NOBUR burr removing TOOLS are used on any machine tool... lathe, drill press, portable electric drill or at end of a flexible shaft.

Furnished in 1/16" progressive sizes from 3/16" to 1". NOBUR TOOLS are the economical solution to your burring problems



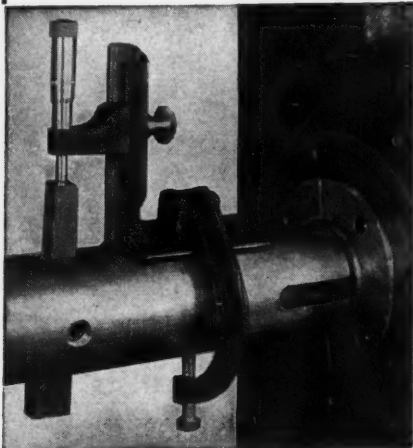
USED on any machine, the smooth, clean, cutting action of the NOBUR will pass the most critical inspection. NOBUR is a time-saving, mistake-saving shop tool that eliminates slow, costly hand methods of burring. It lowers production costs and increases production by hastening approval of finished parts. Easy to operate... no skilled help is necessary... green 'trainees' or women operators can do burring with speed and accuracy... NOBUR minimizes costly reworking and enables the operator to do more in less time... NOBUR is simple in construction... rugged... important parts are hardened and ground... shaft is finished to a diameter slightly under its basic size... double-edged cutting blade is of special tool steel, cuts freely in either alloy steels or soft metals. Order through your distributor NOW... or write for literature direct to the

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How to Set Boring Tools Speedily and Accurately Essential in War Production Shops



Typical Boring Bar Application

Mike the hole after rough boring, clamp tool setting gauge to bar, bring micrometer down to tool tip, using the slide for rough adjustment. Back off micrometer the number of thousandths required to bore hole to size, adjust tool to micrometer and lock the tool. Remove gauge and proceed with work.

The gauge may be had with either a micrometer or dial indicator.

ADVANTAGES . . .

- Eliminates trial boring.
- Eliminates oversize holes.
- Saves labor and machining time.
- Saves scraping at time of assembly.

Write for details of other applications,
illustrated folder and prices.

BARTELT ENGINEERING CO.

1214 PARTRIDGE AVE., BELOIT, WISCONSIN

them has me stumped. I wonder if some one makes a jig that will make a spring and put the ends on it."

I know of no jig that will form loops when the spring is wound, but the O'Neil-Irwin Company makes a very clever little bending machine which will be found useful for



Fig. 1—Regular Full Loop Spring Ends

forming this task as a separate operation. I enclose a few sketches, with explanation, which may be of assistance.

Probably the most widely used spring end, and the most easily formed, is the regular full loop, parallel and flush with the side, as shown

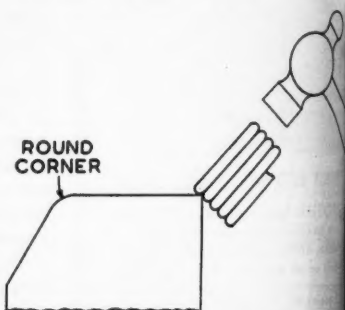


Fig. 2—The Loop is Made by Separating Last Coil from the Spring, Using a Square-Edge Block and Hammer

Fig. 1. To form this type of loop, the only tools needed are a hammer and a square-edge block. The spring is held at an angle of about 45 degrees, with the corner of the block between the first and second coils, as shown in Fig. 2. A sharp blow

Announcing ANOTHER "WEAPON FOR PRODUCTION" THE "MX" WHEEL

*Pioneered and offered to industry
exclusively by Carborundum*

LESS than a year old, the "MX" Wheel is already making a name for itself as a "Weapon for Production." It is a free-cutting wheel capable of light stock removal and high polishing action at the same time. It requires but little pressure. It is used dry, since no coolant is required at the low cutting temperature developed. And its flexibility adapts it particularly for use in finishing and polishing out-of-the-way places on airplane engine parts and similar work.

Some typical applications are indicated by arrows on photos below. They include breaking down burrs or sharp edges on gear teeth, finishing and polishing splines and hard-to-get-at flat surfaces, depressed areas and various types of undercuts.

These new wheels are so fabricated as to give variable degrees of resiliency and flexibility, in six grades of hardness. They are made in grits 50, 80, 120, 180 and 320. Diameters range from 1" to 12", and thicknesses from $\frac{1}{16}$ " to 3". More complete information on request.

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(Carborundum and Alusite are registered trade-marks and MX is a trade-mark of, and indicate manufacture by The Carborundum Company.)

with the hammer will separate the last coil from its neighbor.

Care must be used to avoid mark-

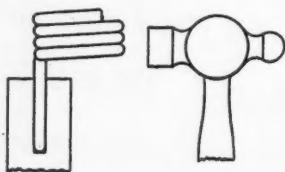


Fig. 3—By Inserting the Loop into a Groove in the Block and Striking with a Hammer, the Loop is Twisted to a Central Position

ing the wire, which will occur if the corner of the block strikes the inside of the opposite coil. If the opposite corner of the block is formed to an obtuse angle, and is well rounded, it will be found useful in bringing the loop up to the desired position.

If it is desired to have the loop centered with the coils of the spring, the loop, after forming as in Fig. 1,

is placed in a groove cut in a block and struck with the hammer, as in Fig. 3, which will twist the loop to central position.

As the number of shapes to which spring ends are formed cannot

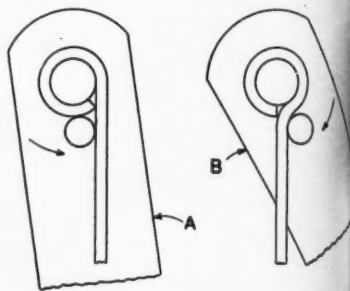



Fig. 4—Method of Forming an Extended End. The Tool is a Piece of Flat Stock in Which Two Pins Have been Driven


counted, it is impossible to give definite instructions as to how

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Have you ever benefitted by some resourceful Distributor's *borrowing* of tools or supplies that neither he nor you had in stock on a particular day?

Knowing his territory as he does, the Distributor usually knows what manufacturer has a temporary surplus of what—and can spare a supply until the stock can be replenished.

You *always* need your Industrial Distributor—not just as a telephone number or street address, but as Chief Headache Absorber for your Purchasing-Expediting Department.

Your Distributor is trained to give you a hand on Priorities, too.

Draw on his experience for obtaining the supplies you need. It certainly will be the exception if you don't meet men of your own measure—in fact we are sure they *will* be.

These same Mill Supply Houses have served for many years as this Company's Distributors of Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout Industrial America.



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ber,

forming may be accomplished. Quite frequently a simple tool can be used to perform the operation quite rapidly. For example, Fig. 4 illustrates the method of forming an extended loop end, the tool being merely a piece of flat stock into which two pins have been driven. A straight length of wire is permitted to remain on the ends of the spring and an eye is first formed as at A, which is then centered by reversing the rotation of the tool as at B.

It is well to remember that any forming of the spring wire sets up additional stresses at the points of bending which should be relieved by a long draw (4-5 hours) at 400-500 degrees Fahrenheit.

"Plastic Parts for War Production" is the subject of an illustrated folder now being issued by the Creative Plastics

Corp., 963 Kent Ave., Brooklyn, N. Y.
Copy free upon request.

Machine Tool Builders Elect Officers

John S. Chafee, Vice President, Brown & Sharpe Manufacturing Co., Providence, R. I., was elected President of the National Machine Tool Builders Association at the Association's annual meeting in the Waldorf-Astoria concluded today.

Walter W. Tangeman, Vice President of the Cincinnati Milling Machine Co., Cincinnati, Ohio, was elected First Vice President of the Association. Fred E. Chapin, President, National Acme Co., Cleveland, Ohio, was elected Second Vice President; and David Ayr, President, Hendey Machine Co., Torrington, Conn., was elected Treasurer.

New directors elected to the Board were: Joseph L. Trecker, Vice President, Kearney & Trecker Corp., Milwaukee, Wis., Mr. Tangeman, and Mr. Chapin.

Tel Berna continues as General Manager of the Association, and Mrs. F. F. Selbert as Secretary.



90"
110"
134"

ROGERS
"NT"
KNIFE
GRINDER

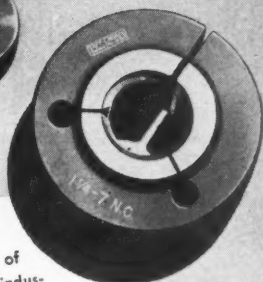
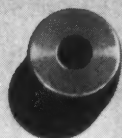
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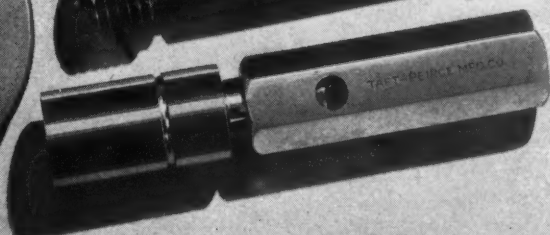
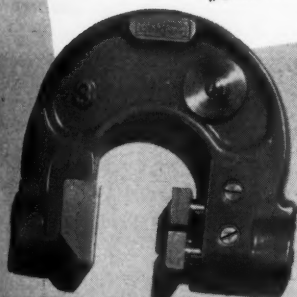
SAMUEL C. ROGERS & CO.
213 Dutton Ave., Buffalo, N. Y.

ROGERS KNIFE GRINDERS
PRECISION QUALITY SINCE 1887



TAFT-PEIRCE GAGES were used in controlling dimensions of military materiel for years before this war began . . . and in industry for years before that. Today the Taft-Peirce Gage Division is a sizable industry in itself, producing one of the world's most complete lines of standard and special gages . . . thousands of which are preserving precision and saving time in arms, munitions, and aircraft production . . . accurately measuring the maximum amount of work per gage.

THE TAFT-PEIRCE MANUFACTURING CO.
WOONSOCKET  RHODE ISLAND



To Finish The Job Quicker:



"LANDIS GRINDERS" AIRPLANE PROPELLERS

With a roar, the plane lifts into the air and is off. Again we are reminded of the importance of things unseen.

Take, for example, the propeller shaft of that plane which has just soared away so gracefully. Its manufacture was a long careful process, with many grinding operations required. Because of the nature of the part, some of the operations were conventional, while others were unconventional, necessitating the use of numerous elements of special tooling.

Leading propeller manufacturers are aware

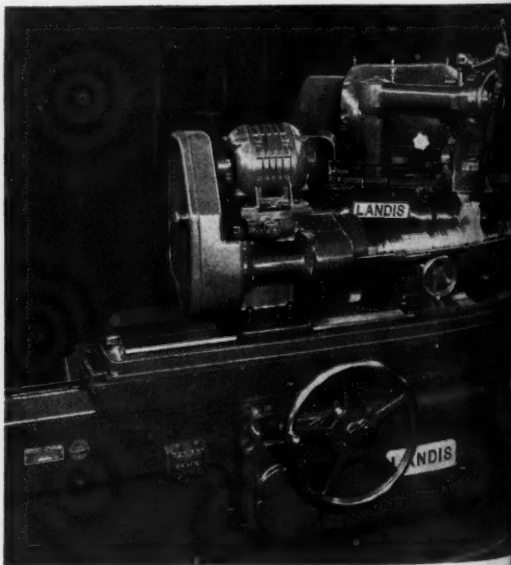
of all this and they are using Landis Grinders extensively to help solve their many grinding problems. Three of the more unusual operations are pictured and described below. The conventional ones, that is grinding the front and rear plain diameters, are performed on standard Landis 14 x 36 Type C Plain Hydraulics.

As new needs arise or production requirements are stepped up, the long experience of Landis in supplying equipment of this kind is available to those who may have need of it.

Grinding the front face of the flange on a Landis 14" x 36" Type C Plain with right-hand wheel mounting and wheel base set at an angle. Shaft is turned end for end to grind rear face of flange on same machine.



*Unusual
Performance
as Usual*



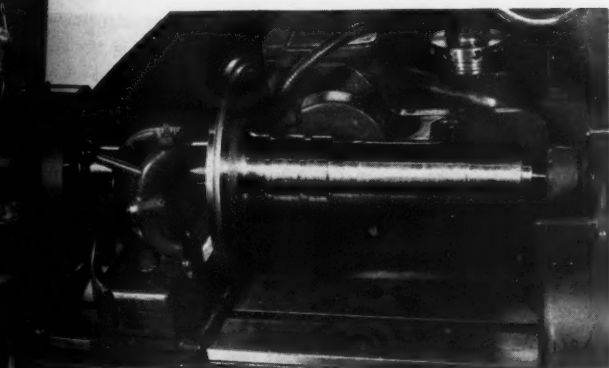
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bearing diameter adjoin-
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blended face. Again,
wheel base is set at an
angle and right-hand
wheel mounting is em-
ployed.



D197



Form grinding fillet ex-
tending under rear face of
flange on a Landis 14" x
36" Type C Hydraulic
Universal. A right-hand
wheel mounting and
small diameter wheel are
used.

LANDIS TOOL CO. WAYNESBORO, PENNSYLVANIA



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403

Modern Equipment at Work

Permanent Wiring on Machine Tools Expedites War Effort

By W. B. WIGTON

Electrical Engineer, The Cincinnati Planer Company

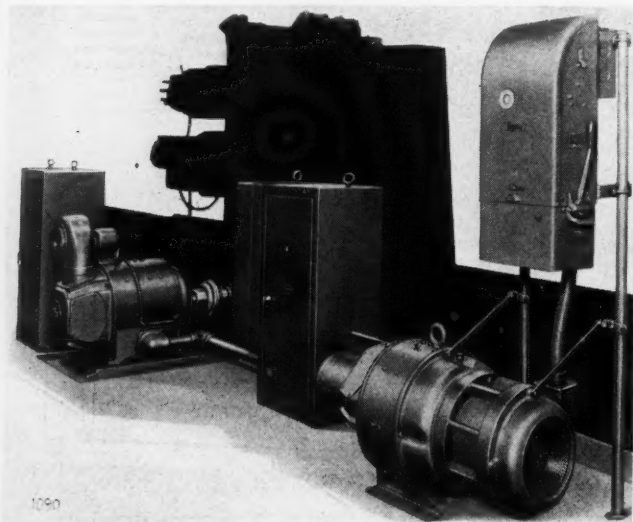
IN the past it has been customary for our customers to permanently wire their machine tools after these tools had been delivered and installed in their plants. Since their electricians were usually unfamiliar with our equipment, particularly with the variable voltage planer drive, considerable delay was usually encountered in getting the machine into production. In some cases this delay amounted to several weeks after the machine had been erected.

For approximately a year preceding the present conflict, the Cincinnati

Planer Company has been equipping its equipment on a permanently wired basis. Our customers have quickly seen the obvious advantage to be obtained and almost unanimously have specified on their orders that their machine tools be permanently wired before shipment.

Our system of wiring has evolved into a standard arrangement which can be prefabricated by our electricians before the machine tool is erected on our assembly floor. All wiring is identified by metal tags with numbers corresponding to those on the wiring diagram, so that any wiring which must be disconnected before shipment may be readily reconnected by our customer's electricians when the machine is installed.

It is now possible to place the machine in production almost as soon as erected. The Cincinnati Planer Company has, therefore, not only taken an interest in getting our machines shipped from our own plant, but has realized that a machine tool is of no use in the war production effort unless it is actually running and producing.



Wiring Set-Up for 25 KW General Electric Variable Voltage Drive on Cincinnati Planer

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"SILVER STREAK" ABRASIVE BELTS SAVE HALF!

Metal goods manufacturer switches to "Silver Streak" belts and cuts belt changes in half... from 8500 to only 4000 changes per year!

● Eliminating 4500 belt changes - in these times - figures up to *added production* and a lot of *valuable time saved!* Money, too! Results like this are typical with "Silver Streak" abrasive cloths. AP's exclusive insulating process makes "Silver Streak" belts and discs longer-lasting, tougher - makes them *stay sharp*, and *on the job*, even when grinding temperatures go up to 1700° - long after ordinary abrasives are worn out.

No matter where you're using abrasive cloths - no matter what type of grinding or finishing job you're doing - there's an AP coated abrasive that will help you do it *better, faster*, in *less time* and at *lower cost*. We can prove it to you - send for **FREE** samples of the AP products you need - *and try them out!* No obligation. Abrasive Products, Inc., 507 Pearl St., So. Braintree, Mass.

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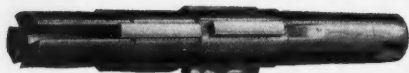
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Especially adapted for holding work with small bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Net Price
1A	$\frac{1}{2}$ " to 1"	\$12.00
2A	1" to $1\frac{1}{2}$ "	16.00
3A	$1\frac{1}{2}$ " to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00



TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

Size No.	Range of Bores Taken	Net Price
1X	$\frac{1}{2}$ " to $\frac{3}{8}$ "	\$10.00
2X	$\frac{3}{8}$ " to $2\frac{1}{32}$ "	11.00
3X	$2\frac{1}{32}$ " to $\frac{3}{4}$ "	12.00
00	$\frac{3}{4}$ " to $\frac{7}{8}$ "	14.00
0	$\frac{7}{8}$ " to 1"	16.00
1	1" to $1\frac{1}{4}$ "	18.00
2	$1\frac{1}{4}$ " to $1\frac{3}{4}$ "	21.00
3	$1\frac{3}{4}$ " to 2"	29.00
4	2" to $2\frac{1}{2}$ "	40.00

(Other Sizes Taking Up to 7" Bores)

Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

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Air Does the Work

THE application of air for clamping work in fixtures for machining offers an excellent solution, in many cases to problems of cost and production. Offered here as typical examples are two air-operated clamping devices

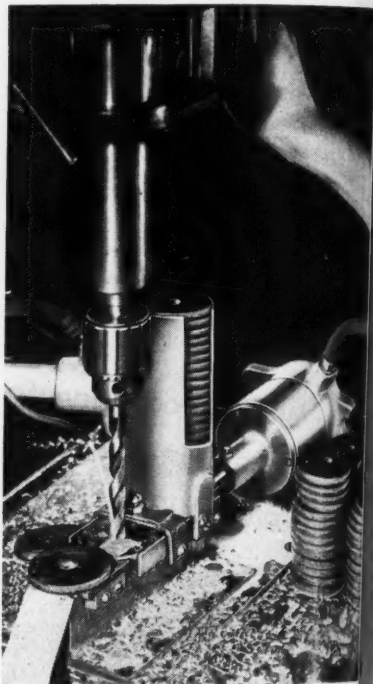
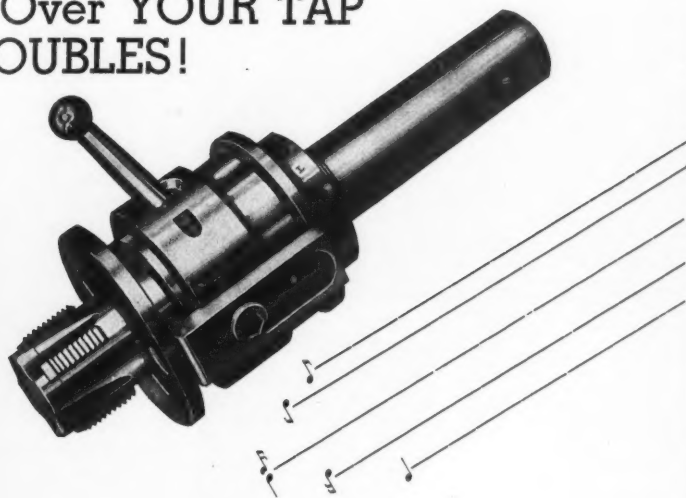


Fig. 1—Air-Operated Device Changes Work piece and Holds Piece in Position for Drilling

made by Mead Specialties Company, Dept. 44, L5 S. Market St., Chicago, Illinois.

In Fig. 1 is shown the setup for drilling to size previously punched holes in $\frac{1}{4}$ -inch steel blanks. The blanks are loaded into a tubular steel hopper which is mounted above a pair of horizontal rails that are fastened to the

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... Over YOUR TAP
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The Class S Collapsing Tap for internal threading is built with Simplicity for Strength and Wear, and has a Positive Trip. Right Lead — Greater Volume — Cuts Sharp, Accurate Threads that will put harmony into your work and keep you in tune with the times.

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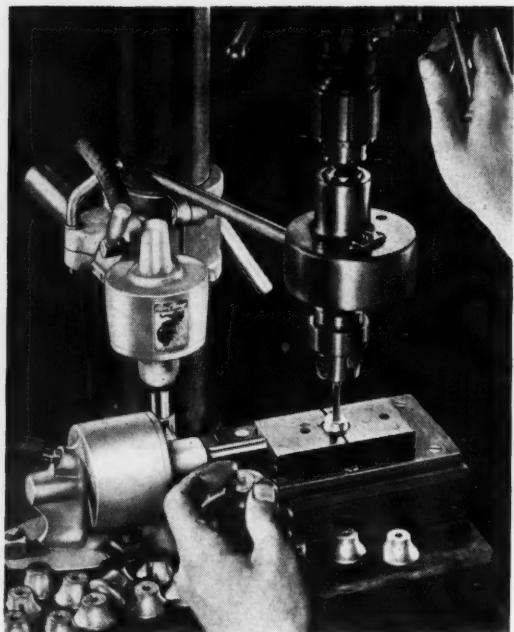


Fig. 2—The Vertical Air-Clamp Holds the Horizontal One, Which in Turn Operates the Movable Half of a Split Clamping Device

machine table. At the left end of the rails a plate with a V-notch in the side is bolted to the top of the rails to locate the workpiece in central position under the drill.

At the right end of the rails is the air-clamping device, anchored in horizontal position. The ram of the clamp-

ing device passes under the hopper, between the rails and in contact with the workpiece at the bottom of the pile in the hopper. The ram carries a pawl on the upper side which carries the bottom blank as it passes under the hopper and carries the blank forward to drilling position, where it holds the blank firmly for drilling.

At the completion of the drilling operation, the foot control is operated and the ram moves back, but on the back stroke a knob on the bottom of the ram tilts the finished blank above the V-block so that as the next block is pushed forward it pushes the finished blank over the top of the V-block and is itself locked in position for drilling.

A single stroke on the foot control button releases the finished blank and brings a new one into position. The diameter of the

blanked hole is increased $3/32$ inch by drilling, and production on this operation is approximately 600 per hour. The operator's left hand is left free to keep the hopper loaded.

In Fig. 2 a setup is shown which includes two models of air-operated clamping devices combined to speed up

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To see errors in dimensions as small as only .0002" or even as large as .002" by depending upon one's sense of touch alone is leaving a great deal to chance. Sense of touch cannot be magnified but vision can be magnified so that we can see errors quickly and accurately.

Visual or Dial Indicator Type Gages enable you to inspect several dimensions simultaneously and to determine the relationship of dimensions with each other. Here concentricity of the outside diameter is checked with the inside diameter. The lower indicator checks the squareness of the end with the axis of the inside diameter and the latter is checked for its own accuracy of diameter, roundness and taper. Try to do this with a "fixed" gage.



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a tapping operation, one clamp being used to hold the other one. The task is to hold die cast knobs for tapping $\frac{1}{4}$ -in. 28-thread without marring the metal.

The essential part of the fixture consists of a divided steel block which has been bored to fit the contour of the knob. One-half of the block moves horizontally, sliding on dowels to ensure alignment with the other half of the block. The moving half of the block is secured to the end of the ram of an air-operated clamp.

In operation the moveable half of the steel block moves away from the other half when the foot control button is pressed, allowing room for the finished piece to be flipped out and a new workpiece to be dropped into the fixture. The blocks close again when the operator's foot is removed from the control button. Production on this item is approximately 540 pieces per hour, including time for blowing chips.

Haskins Portable Flexible Shaft Machines. R. G. Haskins Co., 620 S. California Ave., Chicago, Ill., is now issuing a handy 30-page pocket-size Junior Catalog No. 1-F containing condensed information on its line of portable flexible shaft machines. The catalog, which is illustrated throughout, also includes information on attachments and accessories for use with Haskins Flexible Shaft Machines, as well as data on Haskins Power Screw Drivers. Copy of Junior Catalog No. 1-F free upon request.

Motor-Mica Bulletin. A descriptive bulletin on Motor-Mica Lubricant is now being issued by the manufacturer—Scientific Lubricants Co., Dept. K, 2442 N. Clark St., Chicago, Ill. The bulletin shows how Motor-Mica can be used to help solve perplexing lubrication problems often encountered in stamping, drawing, turning, drilling, milling, threading, tapping, boring, die-casting, and so on. The bulletin also includes detailed mixing instructions for obtaining the maximum benefit from Motor-Mica. Copy free upon request.

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Insert!

★ The above actual photo illustrates the flatness of the surface of a steel molding die insert after it has been lapped by Acme. See how the image is reflected—not a single flaw.

Where molded parts must have a super-fine finish or a perfectly flat face, your most economical, safe-sure answer is an Acme Lapped insert. In fact, there are many instances . . . widely different in scope . . . where Acme Flat Lapping offers the quickest and best solution. For contract flat lapping send us your requirements—no obligation!



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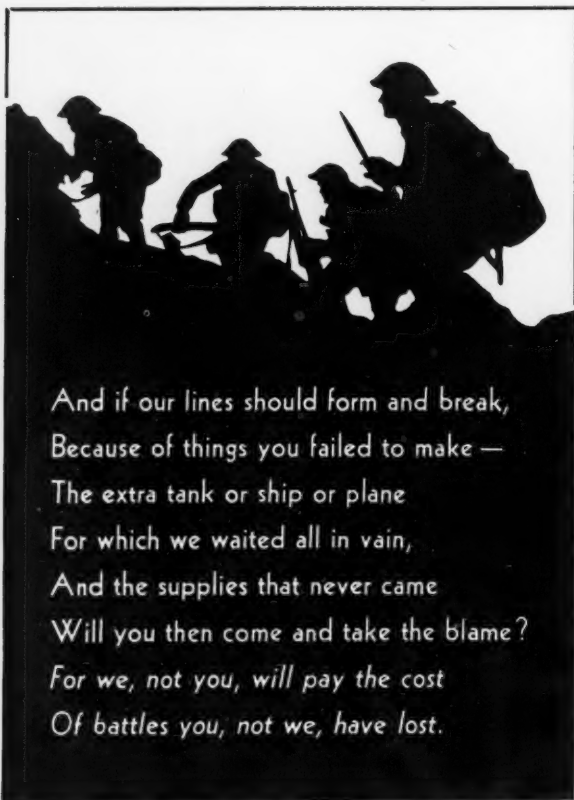
WHEELS of PROGRESS

SYMBOL of VICTORY

Planes and more planes, machines and more machines and back of them goes our symbol of victory. We at BAY STATE are proud of our trade mark. To us it reflects the power of production embodied in abrasive products. To us it shows our part in the gigantic world-wide battle of production.

With greatly expanded kiln and oven capacity, new modern presses, increased personnel, BAY STATE offers greater production, quicker delivery and more accurate grade control of all types of resinoid and vitrified bonded abrasive products. Wheels of Progress indeed!

BAY STATE
ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.



And if our lines should form and break,
Because of things you failed to make —
The extra tank or ship or plane
For which we waited all in vain,
And the supplies that never came
Will you then come and take the blame?
For we, not you, will pay the cost
Of battles you, not we, have lost.

"THINKAMERICAN" Posters

REPRODUCED on this page is one of a series of 20 x 27-inch posters which are now being printed by Kelly-Read & Company, Rochester, N. Y., in response

to a request from a group of business and industrial executives who recognized the need for action to combat un-American propaganda activities.

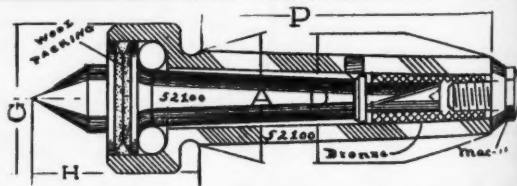
Inasmuch as 85 per cent of all human knowledge is gained through the eyes, rather than through the ears, a statement made on an attractive bulletin or poster will be remembered long after the same statement, made orally, would have been forgotten. Further, a visual message, logically displayed, will be seen many times, in the course of which the message will become fixed in the mind of the observers.

These posters are unquestionably doing an important job; thus with the permission of Kelly-Read & Company various of these posters will be reproduced here in subsequent issues of this magazine.

Fray No. 9 Ram Type Milling Machine. A four-page illustrated folder

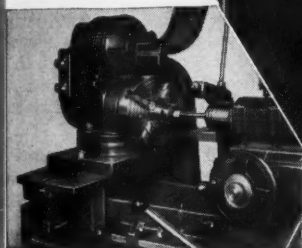
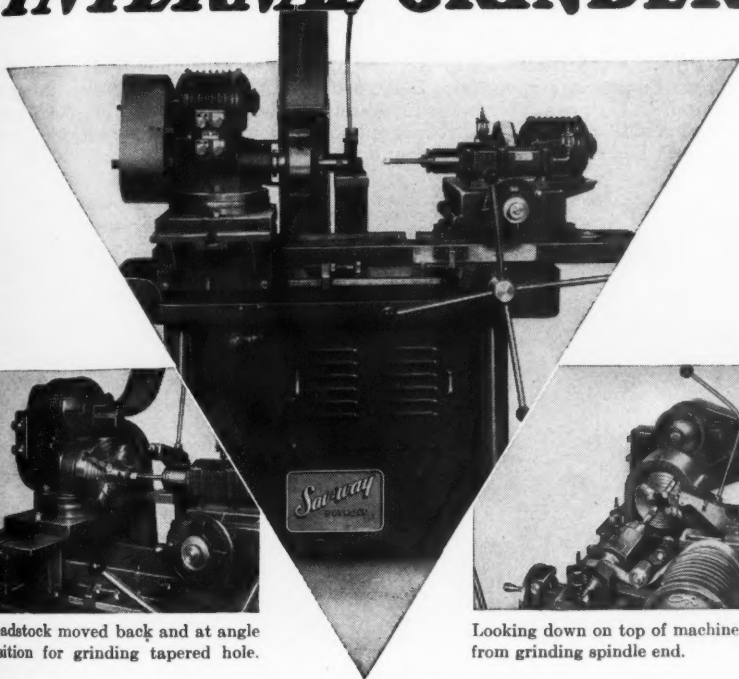
covering the features, operation, specifications, and so on, of the Fray No. 9 Ram Type Milling Machine for performing a wide variety of operations is now being issued by the Fray Machine Tool Co., 503 W. Windsor, Glendale, Calif. Copy free upon request.

THE RIGID LIVE CENTER is more remarkable for what is left out than for what is put in. It is simple in design, highly efficient and popular among users.

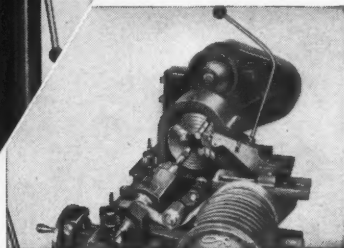


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Headstock moved back and at angle position for grinding tapered hole.



Looking down on top of machine from grinding spindle end.

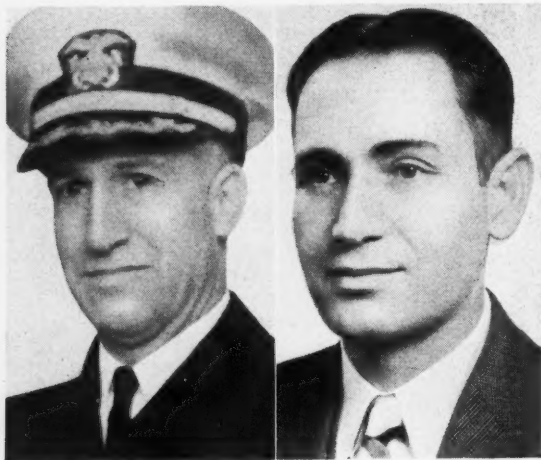
Offers greater flexibility . . . a precision grinder, designed and built by engineers with years of practical experience to guide them . . . has a headstock traverse of 6" . . . grinds holes $\frac{1}{4}$ " to 18" in diameter . . . holes up to 9" deep, straight or tapered . . . entire headstock may be moved at right angle to wheel traverse, by merely loosening two conveniently located nuts . . . worm compensating device permits grinding wheel head adjustment to .0001 . . . sturdy construction throughout . . . full specifications, delivery time and price on request.

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Lincoln Foundation Welding Study Awards

CAPTAIN C. A. TREXEL and A. Amirikian, Director of Planning and Design, and Design Engineer, respectively, Bureau of Yards and Docks, Navy Department, Washington, D. C., have been announced as recipients of the \$13,700 Grand Award in the nationwide 2½-year \$200,000 scientific welding study program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.



Captain C. A. Trexel and A. Amirikian, winners of \$13,700 Grand Award in Lincoln Foundation Welding Study

The 2½-year welding study, known as the "\$200,000 Industrial Program Award Program," brought forth reports of welding progress prepared by executive engineers, designers, architects, production officials and others throughout the industrial field. The study indicated a possibility of tremendous savings in costs and man hours for production of products by arc welding in both war and peace.

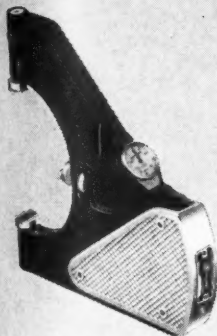
"Savings in critical materials and in production costs," said Dr. E. E. Dreese, Chairman of the Lincoln Foundation, and of its Jury Award, "reported available by arc welding in the award studies, assume such proportions as to be of vital national significance.

"The figures, based on representative products and structures, show a possible annual cost saving of \$1,825,000,000. This includes 7,000,000 tons of steel valued at \$271,000,000 and 153,000,000 man hours of labor. This saving in man hours will place the industrial manufacturer in a strong position to compete in future world markets."

The subject of the study by Captain Trexel and Mr. Amirikian, which qualified for the First Grand Award, was "Caissons for Naval Dry Docks." Former methods of design were discussed and compared with alternate designs of all-welded construction, the all-welded design being submitted for bids. Eight contractors participated in the bidding. The low bid for the two caissons of welded design was \$108,000 less than that for the previous method of construction, amounting to 25 per cent in cost. Net savings on caissons built, under contract, and projected for the immediate future will amount to more than \$5,000,000.

The second Grand Award of \$11,200 went to John L. Miller, Chief Metallurgical Gun-Mount Division, Firestone Tire and Rubber Company, Akron, Ohio, for his paper on the redesign for welding of the 40 mm Bofors Anti-Aircraft Gun. The total savings on 35,000 units is estimated at \$6,000,000. The Third Grand Award, \$8,700, went to H. Thomasson, Canadian Westinghouse Company, Ltd., Hamilton, Ontario.

The awards totalled 408 and represented every conceivable division of industry.



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INCREASE TOOL LIFE

by Using Refined Surface

Norton engineers in cooperation with prominent tool engineers have developed fine grain tool wheels to make possible a finishing method that greatly increases cutting tool life.

WORKING with the chief tool engineer of a large textile machinery company, Norton engineers developed a special, fine grit tool wheel which enabled a new theory of tool sharpening to show remarkable increases in cutter life. Then, working with the tool engineers of a large airplane motor manufacturer along similar lines, even greater increases were obtained in the life of single point tools.

Today, with high speed tool steels so difficult to obtain, the increase in tool life made possible by refined surface finishing is of tremendous importance.



Fig. 1—Finish grinding a cutter with a 320 grain Crystolon wheel.

The high surface finish method is based on the principle that the perfect cutting edge is an *unbroken* line at the junction of two planes, usually forming an acute angle. This line must be unbroken in order to equalize the load placed on the cutting edge and a microscope shows (Fig. 4) that ordinary grinding does not produce such a line.

The accompanying illustrations clearly show why the high surface method increases tool life. In Figures 2 and 3 note the hills and valleys running into each other, from hill to hill and valley to valley, but happening so rapidly, causing a ragged broken line of peaks and valleys.

It is quite obvious what takes place when the tool is put in use, the unsupported peaks are unequal to the heavy load imposed upon them and quickly break off leaving flat spots that rub instead of cut.

This places a greater load on the remaining edge which soon turns out faster than it would if the edge were straight and the load equally distributed. In the meantime these flat spots continue to abrade, tearing the stock off instead of giving a smooth clean cut and at the same time generating heat through this friction, the heat eventually affects the cutting edge and naturally the hardness of the cutter. The result—a dull tool.

Surface Finishes on Your Cutting Tools

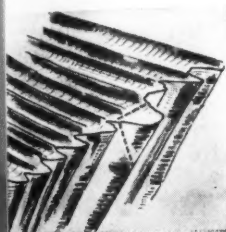


Fig. 2—A cutting edge as ordinarily ground would show "hills" and "valleys" like this under high magnification.

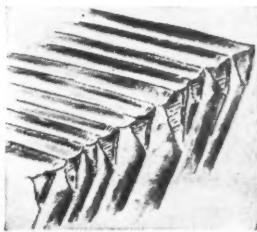


Fig. 3—Note how the "peaks," unequal to the heavy load, break off, quickly dulling the cutting edge.

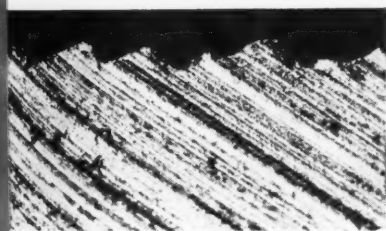


Fig. 4—Edge of cutter as commonly reground (100x).

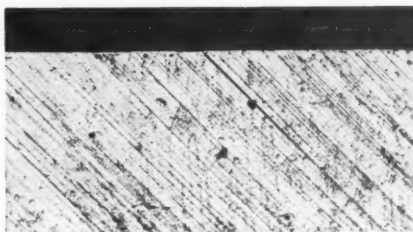


Fig. 5—Same cutter—ground to high surface finish. Elimination of hills and valleys gives keen, long lasting cutting edge.

The answer was to devise an economical method of removing the hills and valleys—to make the edge as nearly as possible a straight unbroken line (Fig. 5). Experiments on tool and cutter grinders and surface grinders resulted in the selection of Norton fine grit Crystolon wheels (37320-J8L or 37320-H8T-4) for cutters and other multi-blade tools. For single point tools an Alun-

dum vitrified wheel (38220-L9BE) proved most satisfactory. The time and expense of the extra finishing operation (Fig. 1) is more than offset by the increased tool life and improved quality of work produced.

A booklet "How to Increase Tool Life" will be gladly sent on request. Just ask for Form 986-MS.

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W-894



"CLOSE-UP" of how a veteran Bullard V.T.L. (Vertical Turret Lathe) speeds the War Drive now, as it will once again speed peacetime production later on.

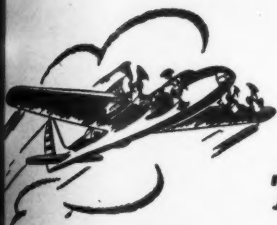
Two heads, cutting at once, as you see them here, mean tremendous time saving — and because the two heads have independent feeds, they can cut simultaneously on several diameters. Separate indexing of heads without stopping the machine cuts lost time between cuts.



Your V.T.L. will still be No. 1 machine in your shop after the war!

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Tools For National Defense

Cross Shell Lathe

Designed for mass production, the Cross Shell Lathe illustrated herewith has been brought out by the Cross Gear Machine Co., Detroit, Mich. The lathe, which is arranged for easy and safe operation by unskilled labor, is equipped with an overhead tool carriage which provides six carbide cutting tools with rigid support close to the cutting edge and permits chips to fall clear. All tools are said to cut simultaneously and without vibration while finishing rough forgings to form in one operation. All cutting forces are directed down to the bed of the machine, thus eliminating tendency to lift tools away from their support. Tool thrust is transferred directly

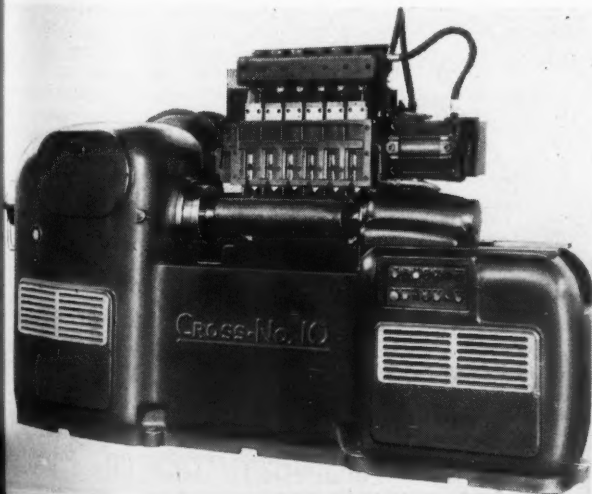
to hydraulic cylinders.

All handles and levers have been eliminated in the design of the Cross Shell Lathe, operations and parts of the machine being controlled by means of electric push buttons which are interlocked for safety and mounted on a central control panel located in the tailstock. Precision dial adjustment is provided for setting electric timing control of the automatic operating cycle of the lathe.

The headstock spindle is mounted on two straight roller bearings and a ball bearing to absorb radial loads, plus two roller thrust bearings to absorb thrust loads exclusively. Operating efficiency, according to the manufacturer, is not affected by expansion or contraction between spindle and headstock. All moving

parts of the headstock are automatically lubricated by means of forced feed oil pressure. Spindle speeds are changed through pick-off gears.

The tailstock of the machine is provided with hydraulic rapid traverse and moves on hardened and ground steel ways which are automatically lubricated. A live



Cross Shell Lathe

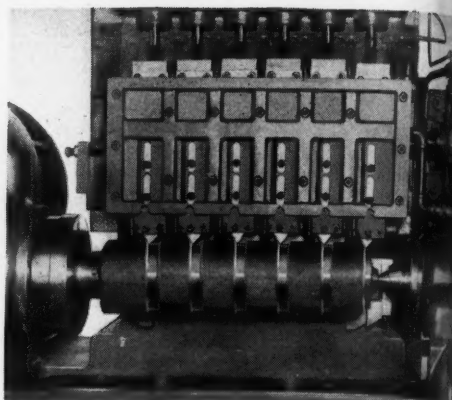
Close-Up View of Overhead Tool Carriage of Cross Shell Lathe

spindle is mounted directly in the tailstock on anti-friction bearings to eliminate quill construction and reduce overhang. In setting up work, the center of the tailstock is engaged with the work to an exact predetermined pressure and the tailstock then automatically clamped in position by means of a positive mechanical lock.

Specifications of the Cross Shell Lathe are as follows: capacity between centers and swing, arranged to meet requirements; spindle speeds, 110 to 450 r.p.m.; spindle nose, No. 11 American standard lathe spindle nose; feed and rapid traverse, hydraulic; clutch, multiple disc type; headstock gears, cone worm gears; center of spindle from floor, 42 inches; main drive motor, up to 100 h.p. at 1,200 r.p.m., general purpose, open, horizontal, ball bearing, frame 544; floor space required, 135x85 inches; net weight, 23,000 lb.; shipping weight, 24,000 pounds.

Red Ring Model GCL-3" Gear Shaving Machine

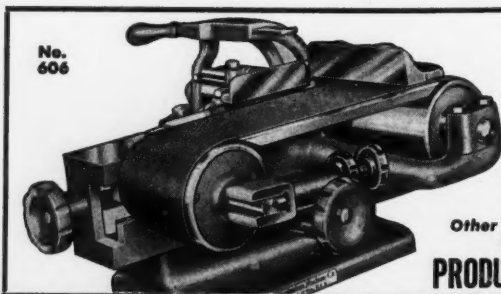
A small gear shaving machine especially designed for quickly and accurately finishing gears $\frac{1}{4}$ to 4-inch pitch diameter for use in navigation instruments,



range finders, gun sighting mechanism, sound detection equipment, bomb sight and so on, has been added to the line of Red Ring machines marketed by the National Broach & Machine Co., 5600 St. Jean, Detroit, Mich. The machine, which is designated as the Red Ring Model GCL-3", is constructed to handle gears with diametral pitches of from 20 to 4 and finer.

The GCL-3" is essentially a bench type machine; however, it is usually furnished with a base which contains an automatic coolant system and an electrical control panel. It may also be furnished without the base, in which case, a separate coolant system and electrical control panel must be supplied. A battery of these machines can be mounted on a large bench with one central coolant system.

The GCL-3" is of vertical construction thus providing the operator full visibility of the work gear at all times. In addition



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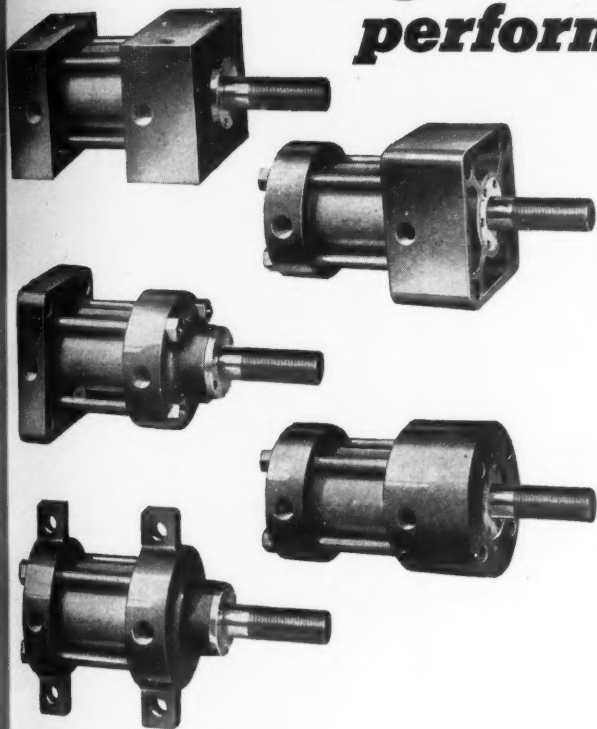
For cleaning and finishing castings, dies, stampings and any work that can be ground. Gives a straight line finish, leaves sharp edges, eliminates hand labor. • A compact, durable, smooth-running machine with quick, convenient adjustments.

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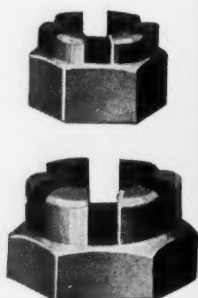
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tion, the machine is arranged so that the work gear has some backlash when it meshes with the cutter, thus eliminating loss of time in bringing the two together and danger of spoilage from haste or carelessness in loading and starting. This backlash is immediately taken up



Red Ring Model GCL-3" Gear Shaving Machine

automatically when the machine starts its cycle. Gears finished by this process are said to show a zero backlash when assembled.

Like other Red Ring gear shaving machines, the GCL-3" incorporates the principle of rotary crossed axes shaving, using a gashed helical cutter which drives the work gear as it is being cut. The

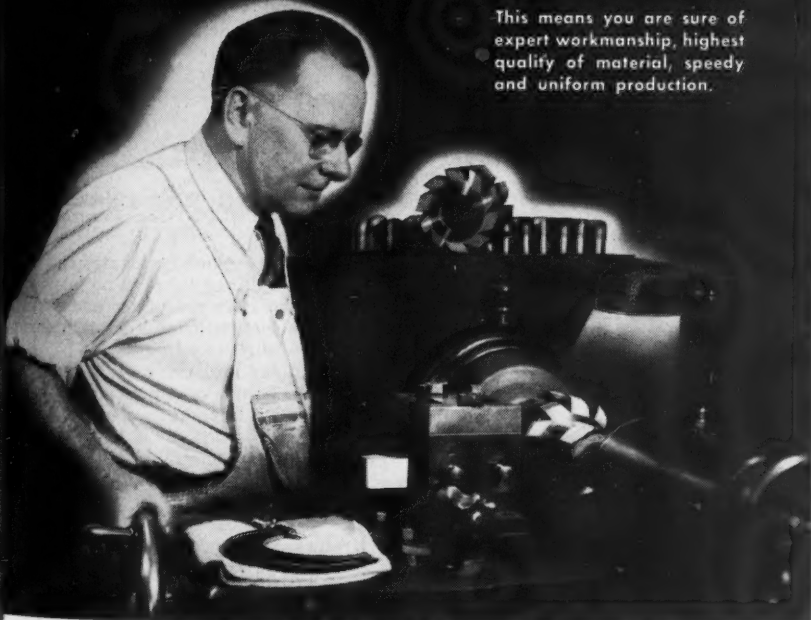


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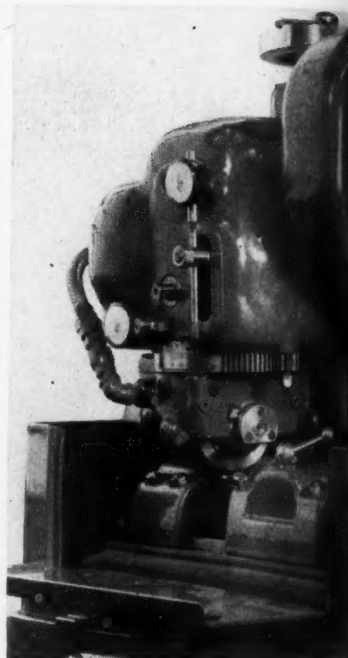
Made by G. W. GRIFFIN CO., Franklin, N. H.

JOHN H. GRAHAM & CO., INC.

General Sales Agent

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NEW YORK CITY



Close-Up View of Working Mechanism of the Ring Model GCL-3" Gear Shaving Machine

cutter of the machine rotates only in one direction. Since there is no intermediate gear train between cutter and work, any possible inaccuracies from such construction are eliminated.

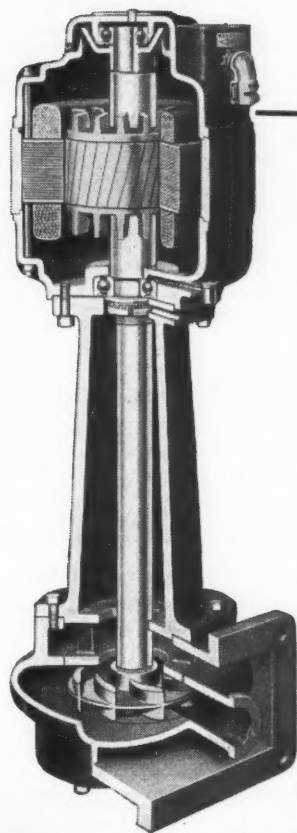
The functional parts of the machine, in addition to the cutter spindle drive, consist of two slides both operated automatically. The vertical slide on which the cutter head is mounted is advanced and retracted to properly size and finish the work and to return to loading position. The horizontal slide carrying the work centers reciprocates the work parallel with its axis across the face of the cutter. The operation of the two slides is synchronized that in one cycle of the cutter head slide, the work slide will make four, six or eight strokes as desired depending upon the amount of metal to be removed. Automatic pressure lubrication is provided to both slides by a pump mounted in the column.

The cutter head slide is actuated by

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cam through a lever arm. One end of the lever contacts the cam surface, the other contacts the head slide. A counter-balance maintains a constant upward pressure on the slide, which, in turn, maintains constant pressure between the lever and cam, thus eliminating possibility of lost motion or inaccuracy in the cutter head slide feed. One complete revolution of the cam corresponds to a complete table cycle of four, six, or eight strokes. The cam is so shaped that at the end of a cycle, the slide rises to throw just enough backlash between work gear and cutter to permit easy unloading. Cam speed is varied by means of change gears. Automatic stopping is provided at the end of a cycle.

To accommodate various sizes of work gears, the initial vertical adjustment of the cutter head slide is made by means of a screw and calibrated handwheel. The finished gear size is controlled by the cutter head cam. A precision indicator on the front of the vertical slide provides a constant check on the size of the finished product.

The cutter head is adjustable about a

vertical axis to obtain the correct angular relationship between the axes of the work gear and cutter. The cutter spindle is driven by V-belt from the same motor that reciprocates the table. Three cutter spindle speeds are available. The precision bearings of the cutter spindle may be adjusted without dismantling the cutter head.

Table reciprocation is likewise attained by a cam and lever operation which provides a slight dwell at the end of each table stroke. Three speeds of table reciprocation are available.

Both the headstock and tailstock of the machine are equipped with dead centers. The tailstock spindle is spring loaded to assure a constant and predetermined pressure between the centers and the work. This pressure is adjustable and sufficient for properly holding the work but not great enough to burn either the centers or the work. A single lever retracts and locks the tailstock spindle.

The base of the machine, as previously mentioned, houses the electrical control panel and coolant system. The electric panel is completely recessed and

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3 TO 6 TIMES FASTER are claims made by users of this method for smooth, even grinding. Here you combine controlled stock removal features of a snagging wheel and smooth, even surface grinding features of disc grinders. The machine can be tilted to follow contours. Swing Grinders using Segment Face Contact Wheels and 3-M Abrasive Belts are free of chatter and are being adopted for speeding up war production in hundreds of plants.

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November, 1942

MODERN MACHINE SHOP 205

easily accessible through a door, locked shut by a combination lock and safety disconnect switch. The coolant system is complete with motor, pump, ample reservoir, and screened chip basket. The latter can be easily removed through a convenient door. Toe and knee room is also provided for the operator in the front of the base.

Special Work Holding Fixture for Landmaco Threading Machine

The Landis Machine Co., Waynesboro, Pa., has developed a special work holding fixture for use with its Landmaco machine for threading vital components required in the munitions industries. The fixture provides a means for accurately and rigidly supporting such workpieces during the threading operations.

The design of the fixture includes a work-aligning arbor on which the work is retained by a collar which fits a square milled close to the end of the arbor. A lever-operated cam arrange-



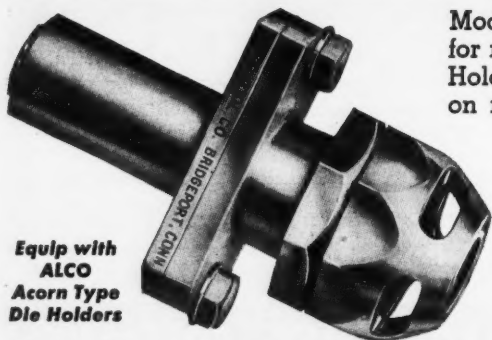
Special Work Holding Fixture for Landmaco Threading Machine

ment at the rear end of the arbor provides a means for drawing and locking the workpiece on two driving and locking pins.

In use, the special work holding fixture is fastened to a faceplate which

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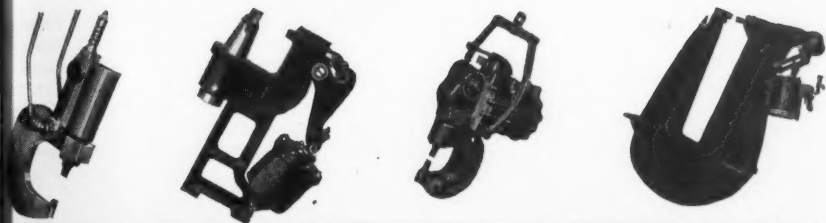
Stop those taper threads - Stop those torn threads - Cut perfect threads all ways.

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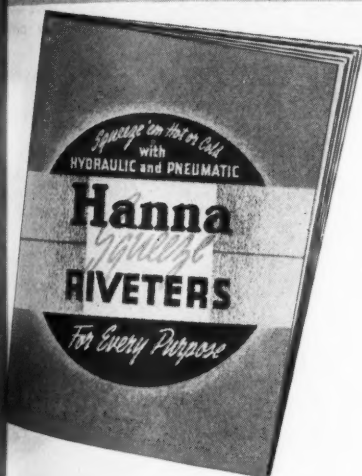
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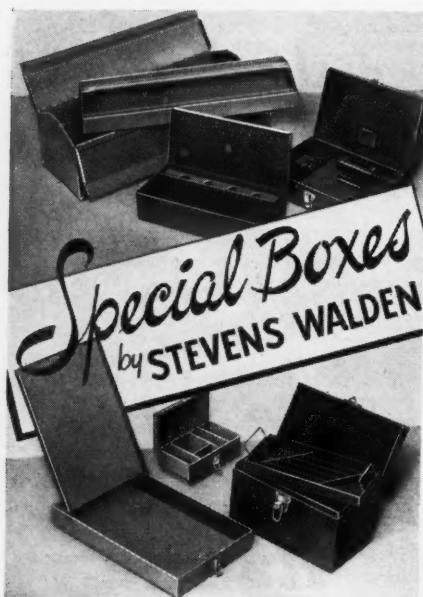
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turn, is bolted to the machine carriage in place of the conventional carriage front or vise. The fixture can be adjusted both horizontally and vertically on the carriage to assure accurate and permanent alignment of the workpiece with the center of rotation of the threading unit.

Detroit Production-Standardized Special Shell Taps

In order to put the manufacture of special taps for shells on a quantity production basis, the Detroit Tap & Tool Co., 8432 Butler St., Detroit, Mich., is now

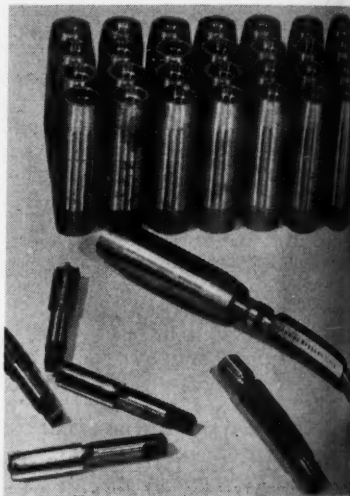


Illustration showing group of 40 mm. shell taps together with newly production-standardized special Detroit Shell Taps, also Detroit thread gage for checking shell threads

standardizing the production of special taps for tapping both ends of 20 and 40 mm. shells.

Phillips Automatic Shell Degreasers

A line of automatic shell degreasing machines designed to efficiently degrease the interior as well as exterior of shells.

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When America's aircraft industry started to zoom it started adding SKILSAW TOOLS in quantity . . . to speed up countless operations . . . to get more work done on every shift . . . to build *far faster* the planes that are flying to Victory! Today those SKILSAW TOOLS (and thousands more) are helping production SOAR to heights undreamed of only a year ago.

Are there jobs in your shop that should be done quicker? Talk to your distributor about the big complete line of SKILSAW TOOLS. He can tell you what models will help you most . . . and he'll gladly prove it with a demonstration on your own work.

SKILSAW, INC. 5037 Elston Ave., Chicago, Illinois

New York • Boston • Buffalo • Philadelphia • Cleveland • Detroit
Indianapolis • St. Louis • Kansas City • Atlanta • New Orleans • Dallas
Los Angeles • Oakland • Portland • Seattle • Toronto, Canada

SKILSAW BENCH GRINDERS
for quick, convenient sharpening of bits, tools, twist drills.

SKILSAW TOOLS
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

SKILSAW DISC SANDERS
grind down welds, clean metals, file, buff and polish.

SKILSAW BELT SANDERS
for all sanding and polishing on wood and metals.



casings from 20 to 155 mm. in size is now being offered by the Phillips Mfg. Co., 3475 W. Touhy Ave., Northtown Sta., Chicago, Ill. The machines utilize an ingeniously arranged conveyor belt equipped with swiveled carrier basket-pockets to automatically and continuously place shells in position for forcing Phillipsolv into the shell interiors under pressure. Solvent injection is at an angle which prevents the forming of air pockets and ensures thorough flushing.

Phillips degreasers for handling 20 to

75 mm. shells are portable, requiring neither steam, water, nor gas connections. Heating of solvent and temperature control is by electricity. Large



SAFE

DAYTON SAFETY LADDERS

have every advantage

- No extra man needed to steady—
- Roomy platform for men and tools.
- Great strength, lightweight.
- Guard rails on platform—
- Automatic locking.
- Folds compactly

■

Airplane spruce is used throughout.

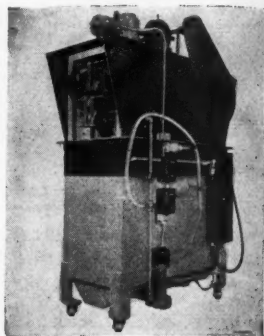
Steel braces.

Safety shoes.

Sizes 3' to 16' in height—Elevating platform adds extra height to Dayton Ladders.

DAYTON SAFETY LADDER Co.

121 - 23 THIRD ST. CINCINNATI, OHIO



Phillips Automatic Shell Degreaser for 37 MM. Shells

shells up to 155 mm. are handled by stationary degreasers.

The unit illustrated is arranged to degrease 37 mm. shells at a rate of 1,500 per hour. The close-up view shows the shell-carrying conveyor. The line drawing shows passage of shells through the degreaser and illustrates how shells with openings at both ends follow one path (dotted line) and those with one closed end take a different course (solid line).

After a shell case has been carried downward through the degreasing vapor and it reaches a position above the solvent nozzle, solvent is injected under pressure to flush the interior thoroughly. As the shell rises on the conveyor, the liquid drains out, and the shell passes

Micro Supreme

for TOOL, DIE, PATTERN, OR TEMPLATE LAYOUT ON METAL

IMPROVED LAY-OUT DYE

for SHARPLY DEFINED SCRIBED LINES

LOW IN PRICE

ONE QUART . . . \$1.00

ONE GALLON . . . \$4.00

FIVE GALLONS . . . \$18.00

MICHIGAN CHROME & CHEMICAL COMPANY

6350 East Jefferson Avenue

Detroit, Michigan

requir
s comm
temper
Lamp

MID-WEST ABRASIVES MEAN *Fewer Rejects* TO THIS ORDNANCE MAKER!

How Costly Are Your Rejects?

Rejects, the bane of all production men, presented a serious problem at the X Corporation — until MID-WEST abrasives helped to eliminate them.

The X Corporation, one of the most vital gun producing plants in the country, had trouble finding the proper honing stones for the roughing and finishing of 20 millimeter guns. The job called for removing about .006 inches of stock — and doing it with machines equipped with three-stone heads.

The stones being used were generating too much heat. The honing operation was too slow. The honing stone "wear" was too fast. The working surface being created was too rough. And most important of all, rejects were entirely too numerous.

A MID-WEST engineer, invited into survey the situation, solved the company's problem. Here's how he did it:

Under pressure and coolant conditions identical with those the company

had been employing he installed MID-WEST 320 103X hones. The new hones produced a fine finish and the honing time was cut in half — but production was limited to two gun barrels per set of stones. Not satisfied with that result the MID-WEST engineer tried again. He installed MID-WEST 320 120X hones. He also reduced the hydraulic pressure from 175 pounds to 125 pounds and suggested a thinner coolant. Those two changes, along with the 320 120X hones, did the trick. They resulted in:

- ✓ **FASTER CUTTING ACTION**
- ✓ **A MUCH FINER FINISH**
- ✓ **A LONGER HONE LIFE**
- ✓ **ALMOST COMPLETE ELIMINATION OF HEAT**

What MID-WEST MICRO BOND honing stones did for that manufacturer they also can do for YOU! Why not let our engineers — located in most large cities — prove it to you?

MID-WEST ABRASIVE COMPANY

Manufacturers of *DEPENDABLE* Abrasives

1960 E. MILWAUKEE AVENUE

DETROIT, MICHIGAN



- ★ *Honing Stones*
- ★ *Superfinishing Stones*
- ★ *Grinding Wheels*
- ★ *Emery Cloth*
- ★ *Sandpaper*

Mid-West Abrasive Company,
1960 E. Milwaukee Avenue,
Detroit, Michigan

Gentlemen: Please send me additional information on Mid-West Micro Bond honing and superfinishing stones.

Name

Company

Address

They Cut So Fast-
Yet Last So Long



"LENOX"

MO-SPEED Molybdenum

In these days when faster production on metal cutting jobs is so important, more shops are demanding **LENOX MO-SPEED MOLYBDENUM**. We suggest you try them.

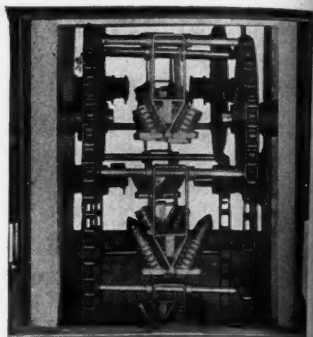
*Carried by selected
Distributors from
Coast to Coast. See
yours today.*

LENOX

*The Blades in
the Plaid Box*

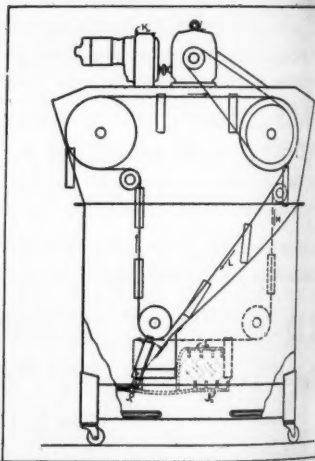
**AMERICAN SAW & MFG. CO.
SPRINGFIELD, MASS.**

through a hot vapor zone, thus reaching the loading and reloading station at the top of the unit drained, dry, and



Close-Up View of Shell-Carrying Conveyor
Phillips Automatic Shell Degreaser

clean. Shell cases open at both ends, follow a path which provides for horizontal travel over a section where two sets of spray heads inject solvent under

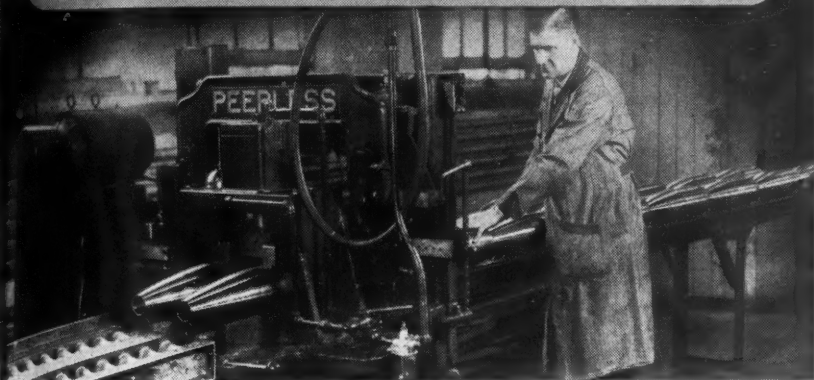


Line Drawing Showing Passage of Shells
Through Phillips Automatic Shell Degreaser

extra pressure required for thorough flushing and cleaning of interiors. The conveyor and its driving mechanism form a removable unit which is mounted

Safe FOR MEN AND METAL

...PEERLESS POWER SAWS



Haste with waste never was sound shop practice! And, today speeds that sacrifice **SAFETY** cannot be tolerated.

While sawing test samples for the Dow Chemical Company, a 14" Peerless High Duty (like the machine shown in the illustration above) cut 10½ sq. in. per minute. The bar of Dow metal was 11¾ inches in diameter — 108.43 sq. in. per cut. A two-tooth blade was used.

Fast cutting with maximum safety for men and metal has won broad acceptance for Peerless Power Saws in our war industries. Peerless cool-running, straight-cutting blades remove as little as ⅛" of the metal.

These fine cuttings are easily salvaged from the chip tray. Peerless Power Saws also release their operators for other productive work while the cutting progresses smoothly and quietly. The patented, Peerless Four-Sided Saw-Frame, with Backing-Plate Blade-Support guards the life of the blade. Should the blade grow dull and break, under strain caused by neglect, the Peerless stops *automatically* before injury can be caused to MEN or METAL . . . Peerless effectively combines **SPEED** with **SAFETY**! The coupon entitles you to a set of the latest literature.

PEERLESS MACHINE COMPANY • RACINE, WISCONSIN

Peerless

METAL SAWING MACHINES

PEERLESS MACHINE COMPANY, Racine, Wisconsin

- ☐ Mail catalog on Peerless Standard Power Saws.
☐ Mail catalog on complete Peerless line — Hydraulic, Vertical, and Universal Saws.

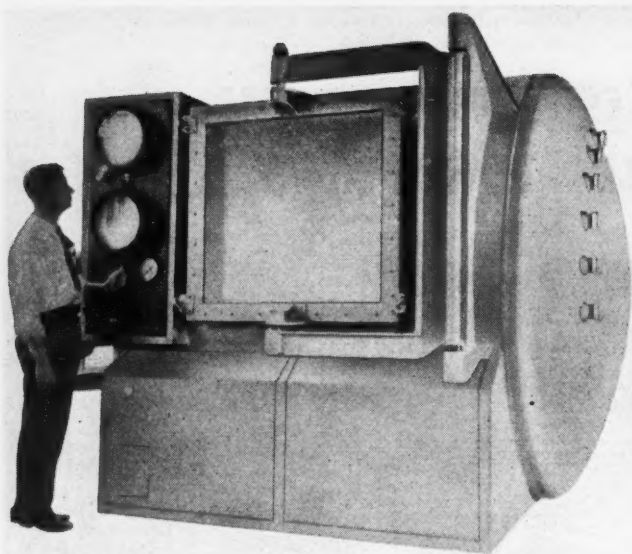
Company.....

Individual.....

Street.....

City.....State..... MM1142

FAST, ACCURATE CUTTING DEMANDS POSITIVE BLADE CONTROL



Kold-Hold Stratosphere Chamber for Parts Testing

has developed a stratosphere chamber which operates between the temperatures of plus 200 deg. F. and minus 75 deg. F., with an internal pressure variation from ambient at the location of the unit to 3 inches of mercury absolute. Both the pressure and temperature variations are controllable throughout their ranges.

in the upper portion of the degreaser housing, thus permitting easy access to the interior of the degreaser for making adjustments and cleaning. The solvent pump assembly located on the lower side of the housing is designed for continuous operation. Thermostatic switches provide protection against overheating.

Kold-Hold Stratosphere Chamber for Parts Testing

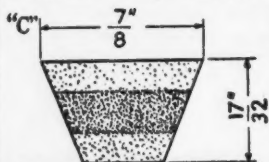
To test the mechanical parts of aircraft as well as radios used at high altitude, the Kold-Hold Mfg. Co., Lansing, Mich.,

The stratosphere unit, which has an interior chamber volume of approximately 186 cubic feet, uses "Freon-12" as a refrigerant. The refrigeration effect, or heat acceptance from the chamber, is by forced convection through coils designed for low temperature work. Each coil is said to accept a minimum of 200 B.T.U. per degree at minus 75 deg. F. and 3-inch mercury pressure.

Humidity is controlled from 25 to 95 per cent, relative to all temperatures above plus 40 deg. F. or at a fixed bottom temperature of plus 32 deg. F. Below this level, absolute humidity corresponds to the air saturation at the coil

The New Type CONTINUOUS LENGTH V LEATHER BELTING with the CLARK BALL BEARING FASTENER

Patent Applied for

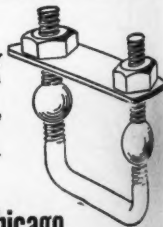


The HEAVY oak tanned MIDDLE PLY does all the PULLING (The ball rides in the middle ply).

The OUTSIDE soft leather PLIES do the GRIPPING.

WATERPROOF — OIL - RESISTING — LONG - LIVED.

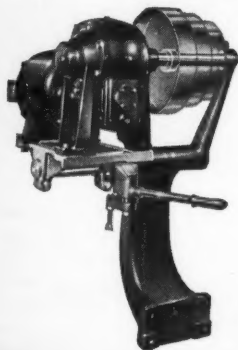
Made in A, B, C, and D sizes.



Victor R. Clark Belting Co., 605 W. Washington Blvd., Chicago.

Hundreds of WAR PLANTS are PUSHING PRODUCTION with MASTERDRIVES

Put MASTERDRIVES on your machine tools to push production . . . to cut maintenance costs . . . to reduce shutdowns . . . and to free your tools from the limitations, hazards and delays of lineshafts and long belts. Each Masterdrive is engineered, manufactured and guaranteed as a unit for top-performance on a specific machine tool. Each is powered by the famous Master gearhead motor.



550 SPECIFICATIONS

*for practically all machine tool
drive requirements*

Install MASTERDRIVES on lathes, shapers, punch presses, milling machines, grinders—on practically any machine tool—simply by drilling and tapping a few holes. It's the quick, practical way to power your tools for MORE PRODUCTION.

WRITE for literature and name of nearest MASTERDRIVE representative.

MASTER Electric Company

INDUSTRIAL EQUIPMENT DIVISION • DAYTON, OHIO

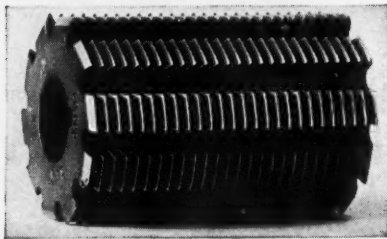
temperature, which averages 15 to 20 deg. lower than the chamber temperature. Heating equipment for higher temperatures is composed of strip heaters so arranged that the forced convection circulates air during the heat cycle.

Three indicating recorders are provided for continuous recording of temperature, pressure, and humidity. Twelve mechanical connector shafts through the outer shell of the chamber project inside the liner, permitting the attachment of either a flexible shaft, angular rigid shaft, or small belt drive to any mechanical part that may be mounted in test position in the chamber. Eighteen electrical connections are provided. A separate machine compartment is located back of the unit but may be placed adjacent to the end.

"Power Press Protection." Released by the Junkin Safety Appliance Co., Inc., 930 W. Hill St., Louisville, Ky., this 16-page booklet deals directly with the operation, maintenance, and safety of power presses. Copy free upon request.

Hobart Arc Welding News Vol. 1 No. 4 Published by Hobart Brothers Co., Troy, Ohio, this edition of Hobart Arc Welding News includes 16 pages containing articles and short items on the application of arc welding to the petroleum industry, cast iron motor block repair, the building of farm machinery, step ladders, smoke shells, and so on. The bulletin also includes other helpful information pertaining to arc welding. Copy free upon request.

Taft-Peirce Price List. A 76-page spiral bound price list of its complete line of products has been prepared by The Taft-Peirce Mfg. Co., Woonsocket, R. I. The booklet includes information on cylindrical plug gages, micrometer plug gages, master discs, plain ring gages, external limit gages, taper gages, thread plug gages, thread ring gages, taper pipe thread gages, thread snap gages, thread measuring wires, sine bars, sine blocks, angle gages, angle blocks, V-blocks, cylindrical squares, parallels, straight edges, toolmaker's knees, adjustable angle plates, angle irons, bench centers, surface plates, boring equipment, and so on. Copy free upon request.



MULTIPLE THREAD MILLING HOBS

—in any thread system, any thread angle, any thread form. Inch or metric scale. Left or right hand threads. Free from distortion. Up to 7" O.D., and 4" thread length for internal or external threading.

TOLERANCES: FOR THREAD DEPTHS AND PITCHES LESS THAN 1/10,000 INCH

These hobs precision cut by methods used for more than 25 years, eliminating any discrepancy between thread form and form of finished work, thus speeding up production without sacrificing accuracy. Full details upon request to Dept. T. Delivery Time: From 1 Week On.

FOR QUICK ACTION CALL PLANT AT CLINTON, INDIANA, TELEPHONE 15.

U. S. MACHINE TOOL MFG. CORPORATION
100 SO. 6TH STREET
TERRE HAUTE, IND.

Make your deposit in the bank

SCRAP piles are much more than mere collections of trim ends, cuttings, useless machines, parts and junk these days. They're vital national resources—*American Treasures*, in fact, in this critical year; because the nation's steel producers will need several million more tons of scrap in 1942 than ever before, if the demands of war production are to be met. • How much can you contribute? Not just the usual scrap flow from your operations, but *all* the idle metal around your buildings and yards that it isn't absolutely essential to keep. Your deposit in the scrap bank will pay dividends all over the world—*make it a real one!*



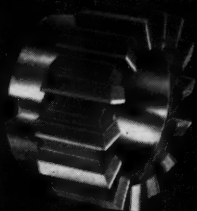
**Allegheny Ludlum
STEEL CORPORATION**

GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

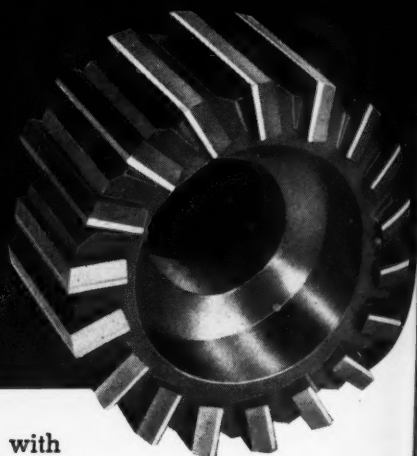
Fabricated Stellite SHELL END MILLS

For Your Cast Iron Milling Operations

LONGER LIFE • HIGHER PRODUCTION • FEWER GRINDS
• HEAT RESISTANT • RIGID CONSTRUCTION •



SHORT BLADE
STYLE



LONG BLADE
STYLE

• For faster milling of cast iron with more pieces per grind, this new series of brazed rigid toothed cutters can be operated at surface speeds of 120 to 170 feet per minute with a chip load of .005 to .010 inch per tooth. Rigidity of the Stellite blades is provided by brazing them into an alloy steel body. Regularly furnished straight flute, right hand cut standard as to hole, counterbore and drive.

Also recommended for use on Brass, Bronze, Copper and Aluminum.

SCULLY-JONES AND COMPANY
1901 SO. ROCKWELL ST., CHICAGO, ILLINOIS



YOUR MACHINE EQUIPMENT

A treacherous, insidious saboteur lurks in every plant engaged in war production. **FRICTION** is his name, and your only safeguard against him is the vigilant protection of **F. B. I.—FREQUENT BEARING INSPECTION.**

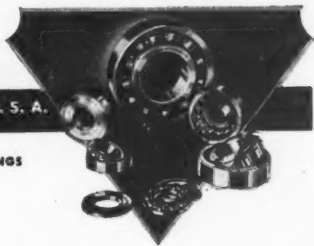
Keep all bearings clean and well lubricated. Exclude dust, dirt and moisture. Use only high-grade lubricants. Watch for the first signs of unusual heat or noise or looseness in the bearings. If possible, keep replacement bearings at hand, for a quick substitution if needed. America, in her vast war program, cannot afford to lose a single machine-hour of production. Guard against such losses by **FREQUENT BEARING INSPECTION.**

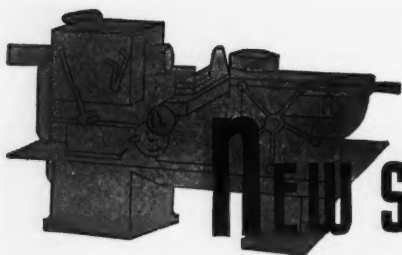
We will gladly cooperate with you in maintaining or increasing your production—by experienced counsel on the use and care of anti-friction bearings, and by supplying you, wherever possible, **NORMA-HOFFMANN PRECISION BEARINGS** for replacements.

Write for the Catalog. Let our engineers work with you.

NORMA-HOFFMANN BEARINGS CORP'N., STAMFORD, CONN., U. S. A.
FOUNDED 1911

PRECISION BALL, ROLLER AND THRUST BEARINGS





NEW SHOP EQUIPMENT

Sundstrand Double End Milling and Centering Machine

The Sundstrand Machine Tool Co., 11th St. and Harrison Ave., Rockford, Ill., is now producing a double end milling and centering machine suitable for milling to length and centering, in one operation, both ends of shafts ranging from 1½ to 6 inches diameter by 14 to 72 inches long.

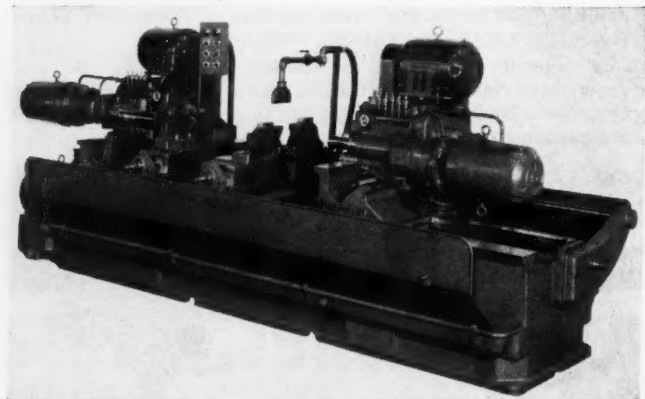
The base of the machine is a one-piece cast iron unit having horizontal ways. Crosswise to the bed ways are mounted two sub-bases which, in turn, have ways on which cross feeding heads are attached. The left-hand sub-base is stationary, while the right-hand sub-base is adjustable for handling various lengths of stock. Mounted on the bed ways between the two heads are two screw-operated self-centering vises for holding the work. These vises are also adjustable for handling various lengths of stock. The drive to the heads is through a shaft driven by a fluid motor. Each head is independently motor driven and is equipped with a cam-

operated automatic centering spindle.

During a cycle of operation, the operator inserts a shaft into the work holding vises and then presses the cycle control button, which causes the heads to be cross fed toward the front of the machine, thus milling both ends of the shaft to length. At the completion of the cross feed for milling, the heads return rapidly toward the rear of the machine until the centering spindles are in correct position, at which point the heads stop. The centering spindles automatically travel longitudinally in a cycle of rapid approach, feed, rapid return and stop.

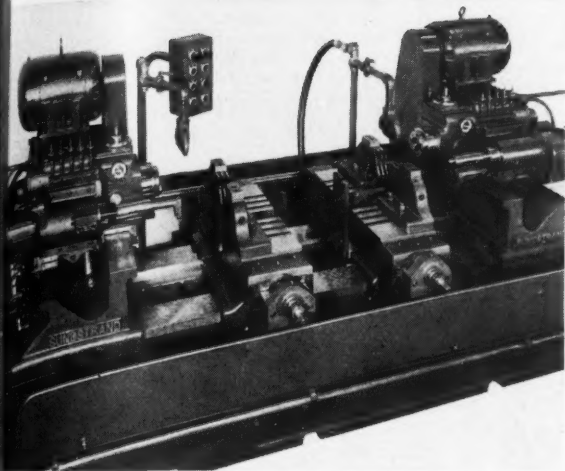
When a cycle of operation has been completed, the operator unloads and reloads the work holding vises. The cycle is completely automatic so that one operator can take care of several machines. Parts are handled but once, thus milling and centering are in a definite relation and can be very accurately controlled.

To further simplify loading and unloading of the work, the Sundstrand Double End Milling and Centering Machine can be equipped with electrically operated vises. A feature of the machine is the use of Sundstrand hydraulic equipment which includes a tank unit, fluid motor, and valves to provide the automatic cycle for feeding the heads.



Sundstrand Double End Milling and Centering Machine

Close-Up View of Sundstrand Double End Milling and Centering Machine Equipped with Electrically-Operated Vises



full use of tools.

Quick, shockless stopping of tools is obtained by dynamic braking. Additional features of the Yoder 3A Horizontal Boring Mill include synchronized vernier scales on head, column, and outer support; hand adjustment screws equipped with screw lock micrometer

dials; two-speed rapid traverse to facilitate inching up to work at slow and fast rate; heavy multiple thread worm gear on spindle drive to eliminate all noise and chatter; high grade alloy steel drive shafts mounted on anti-friction bearings; high strength heat-treated alloy steel drive and feed gears provided with oil pump flood lubrication; and tapered gibs on head, saddle, and table.

All controls of the machine are centrally grouped. Starting, stopping, and reversing of machine and feed are controlled through two bars running along the front of the machine. Control handles may be moved to most convenient position.

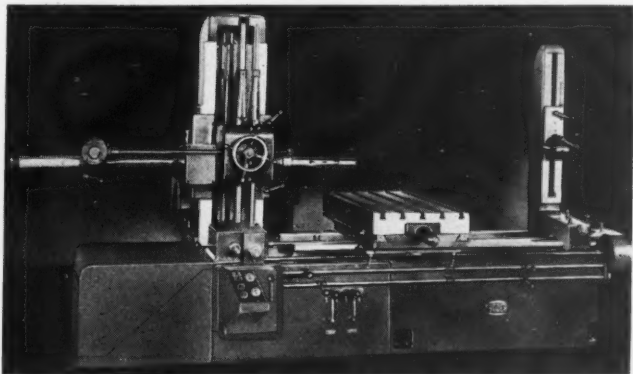
The spindle of the machine is driven directly from a motor, while the feed

A similar type of machine can be provided for handling shafts 1 to 4 inches in diameter by 8 to 48 inches long.

Yoder 3A Horizontal Boring Mill

Designated as the 3A, an improved horizontal boring mill incorporating a power flow drive operating principle which is said to provide the machine with power touch control is announced by The Yoder Co., 5500 Walworth Ave., Cleveland, Ohio. This centralized type of control motivates an infinite number of speeds and feeds which may be obtained without stopping to shift gears.

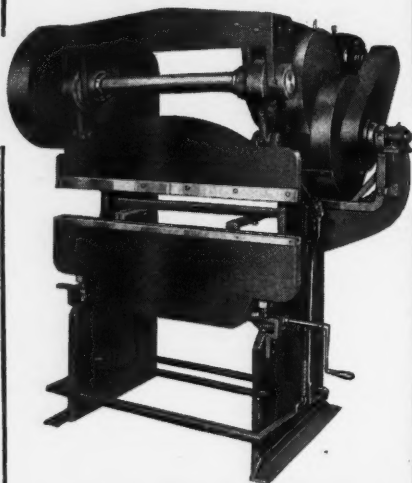
The design of the control causes the positive power flow drive to exert evenly allowable amount of power on tools. In addition, the design enables feeds to be set to a maximum without limitations of step gears for



Yoder 3A Horizontal Boring Mill

CHICAGO STEEL PRESS

No. 253



SPEED WAR PRODUCTION OF SHEET METAL WORK

USE FOR...

1. FORMING
2. EMBOSSING
3. MULTIPLE PIERCING
4. NOTCHING
5. BLANKING

of Ammunition Cases, Bomb Box Liners,
Bomb Fins, Aircraft Parts and Many
Other Offense Products.

The No. 253 CHICAGO STEEL PRESS
is accurate, compact, and ruggedly
constructed of highest quality materials.
Sizes 4, 5 and 6 ft. capacities up to 10
gauge.

Write for Circular No. 255

**DREIS & KRUMP MFG.
Company**

7418 LOOMIS BLVD.

CHICAGO

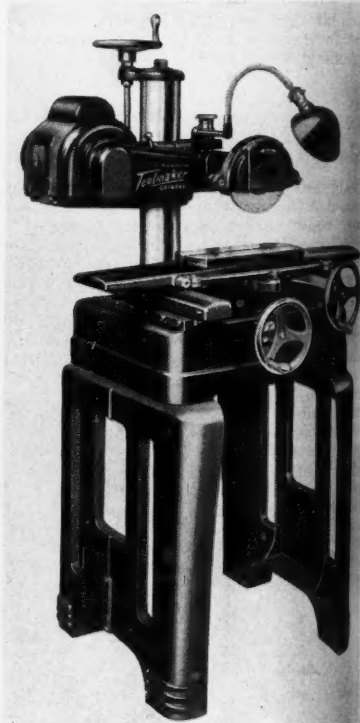
ILLINOIS

drive is effected by means of another motor through a positive clutch. Spindle speeds range up to a maximum of 600 r.p.m.; feeds for head, saddle, and table range up to 100 inches per minute. A flange on the outer end of spindle provides means for bolting milling cutters and other attachments.

Delta Toolmaker Surface Grinder

Designated as the Delta Toolmaker Grinder, a surface grinding machine of versatile design has been announced by the Delta Mfg. Co., 602-K E. Vienna Ave., Milwaukee, Wis. Arranged for easy operation, the machine is said to be ideal for both tool and production shops.

Outstanding construction features of the grinder include a unique wheel-mounting arrangement which utilizes a two-piece adapter so that either wheel



Delta Toolmaker Surface Grinder

ECONOMY GRINDING OIL has revolutionized thread grinding practice.

Throughout the aircraft industry all highly stressed threads are ground on precision thread grinders for accuracy and fine finish with Economy No. 1654, helping to speed production. ECONOMY GRINDING oil permits your wheel to grind a true and accurate form.

When a large amount of metal is removed, ECONOMY GRINDING OIL allows the grinding of a thread in two passes, one rough, one finishing, and the surface of the ground thread possesses accuracy of form with the surface structure undisturbed.

New catalog E-16 well worth reading. Yours for the asking.

THE WHITE & BAGLEY COMPANY

WORCESTER, MASS.

Detroit

Minneapolis



or wheel and adapter can be removed. In this manner, once a wheel has been trued up it can be removed and replaced with adapter and without any further dressing.

The carefully designed extra long spindle of the machine is equipped with widely spaced bearings at either end to ensure permanent true alignment. The forward bearing is a large surface taper bronze bearing which operates in a continuous bath of oil and is provided with take-up for eliminating all play. The rear bearing is a sealed-for-life type.

The table, an improved, smooth-operating unit with conveniently located control handwheels, operates on long ways which provide the table with solid support during all grinding operations, and is machined with a T-slot for clamping fixtures or magnetic chuck. Gibs are provided on the table so that all play due to wear can be eliminated. The handwheel controlling the transverse movement of the table is equipped with a micrometer collar having wide graduations of 0.001 inch, thus permitting accurate settings to be made.

The specially designed column of the grinder is of one-piece construction and is made of high tensile cast iron, normalized and accurately ground to close

tolerances. A steel gib guides the bracket yoke so that it is always in perfect alignment. The entire column together with bracket may be rotated 350 degrees.

Specifications of the Delta Toolmaker Surface Grinder are as follows: maximum length of work that can be ground, 13½ inches; maximum width of work that can be ground, 6 inches; maximum space between 7-inch wheel and table, 9½ inches; maximum space between 7-inch wheel and B & S No. 510 magnetic chuck, 6 inches; table surface, 5¼ x 11 inches; maximum adjustment of wheel by means of micrometer, ¾ inch; maximum diameter cup wheel which can be employed with standard guard in place, 3½ inches; maximum diameter wheel which can be employed, 7 inches.

Hydraulic Machinery Flame Hardening Machine

Hydraulic Machinery, Inc., 10421 Grand River, Detroit, Mich., has brought out the flame hardening machine shown in the accompanying illustration. The machine is hydraulically operated and electrically controlled to provide positive

24 hours...every day with **Schauer Speed Lathes**

SCHAUER Speed Lathes are made to withstand the strain of twenty-four hour production:—all wearing parts are of hardened tool steel—machine ground for precision fit—and assembled by experienced men. For faster, more economical finishing operations of machine parts use **SCHAUER Speed Lathes**—send for Catalog No. 420.

SCHAUER Speed Lathes with Sjogren Chuck—increases output of finished screw machine parts up to 1½" dia. Size of collet is quickly adjusted by hand wheel.

"the originators of today's Speed Lathes"

SCHAUER MACHINE COMPANY

2060 READING ROAD

CINCINNATI, OHIO



ABRASIVE COMPANY

Cylindrical

GRINDING WHEELS

Production Rules for EFFICIENCY

1—The slower the work revolution the softer the grinding wheel. The faster the work revolution the harder the grinding wheel.

2—More metal can be removed in less time with the least grinding wheel wear and a minimum of power by using a soft wheel with slow work revolution taking deep cuts.

3—The harder the material to be ground the slower the work speed and the softer the grinding wheel. The softer the material the harder the grinding wheel and the faster the work speed.

4—The smaller diameter the work the harder the grinding wheel or the faster the work speed. The larger the diameter of the work the softer the grinding wheel and the slower the work speed. Also the larger the work the greater the arc of contact which must be counteracted by reducing the surface speed of the work.

5—If a wheel appears too hard increase the work speed and if a wheel appears too soft decrease the work speed.

6—Work speeds suitable for one piece of work will not necessarily be suitable for others of the same specifications because different pieces of material thought to be the same, especially steel, are oftentimes different and as a result there is a different cutting action.

7—Cutting action will change as the grinding wheel wears smaller. Work speed and wheel speed should be changed at intervals as the cutting action changes, whether duplicate work or a variety of work is being ground.

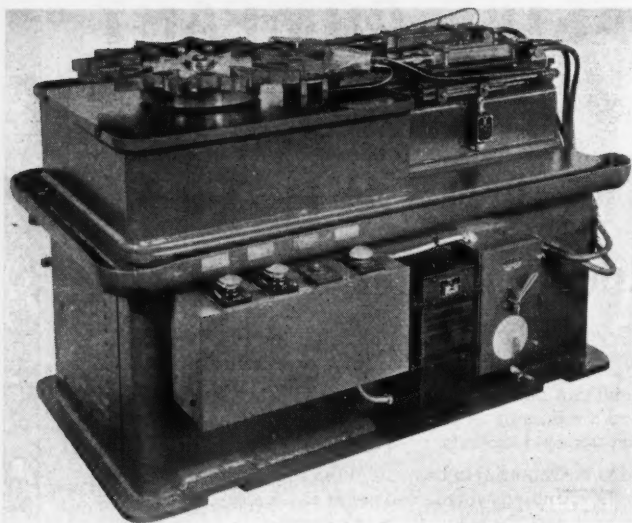
The success of a cylindrical grinding machine operator depends largely on his ability to quickly find the best surface speed for his work, with the grinding wheel speed that is constant. Attempts to "fix the speeds and feeds" for an operation to take care of different classes of work before trial will often result in failure to produce a maximum quantity and satisfactory quality.

1892 FIFTY YEARS OF SERVICE TO INDUSTRY 1942

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

TACONY & FRALEY STS., PHILADELPHIA, PA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES



Hydraulic Machine
Flame Hardening
Machine

manually loaded onto the index table of the machine the pilot position with a locating pin, and the start button pushed. The machine then goes through its complete cycle, following which the machine stops and is manually loaded.

and flexible operation.

The base and external housing structures of the unit are of welded steel design. Parts requiring adjustment and routine maintenance are located on the outside of the machine. Pilot light, burners, and water coolant opening are completely adjustable and are located on the rear slide of the machine together with proper shielding, which directs the flame and the water to the exact surface desired, thus ensuring uniform results. All working parts of the unit are adequately shielded from water as well as the heat of the machine proper, thereby eliminating possibility of distortion and misalignment.

In use, the part to be hardened is

G-E Equipment for Automatic Arc Welding with Heavily Coated Stick Electrodes

Complete equipment for automatic arc welding with heavily coated electrodes in cut lengths has been announced by the General Electric Co., Schenectady, N. Y. The essential elements of the equipment have also been made available in order that automatic arc welding heads originally designed for operation with thyatron-controlled coil electrodes can be converted for successful welding with stick electrodes.


The equipment is said to be particularly suited to work where one or more

"OUTWEARS

the best

Bronze Metal"

20 years



without
a drink—

ARGUTO

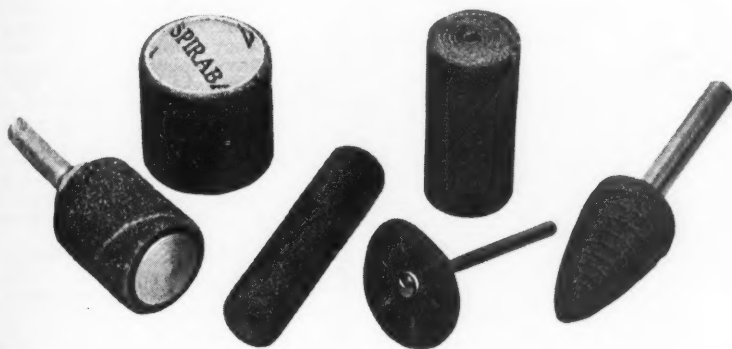
OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.

NORTON ABRASIVES

"METALITE" ABRASIVE GADGETS

for sanding "hard-to-get-at" places



On Portable Tools They Finish in Seconds
Jobs That Used to Take Minutes

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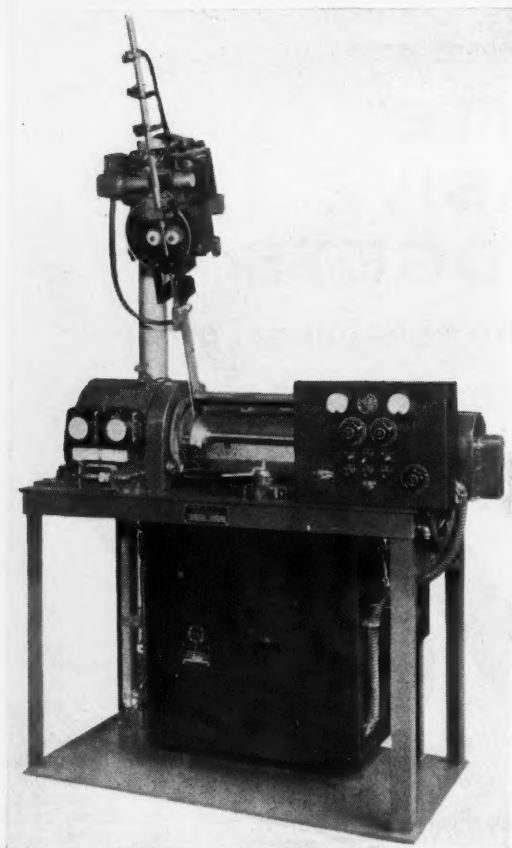
Write Us or Phone a Nearby Branch

*Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit,
Grand Rapids, High Point, Indianapolis, Los Angeles,
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BEHR-MANNING

(DIVISION OF NORTON COMPANY)

TROY, N. Y.



G-E Equipment for Automatic Welding with Heavily Coated Stick Electrodes

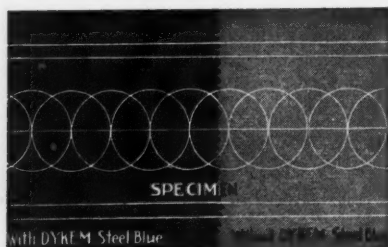
a single weld bead overlap. The equipment can be used to make edge, lap, fillet, and groove welds. Specific applications include the welding of machine gun water jackets, tank wheels, ordnance shells, and refrigeration parts.

The equipment is similar to that used for welding with coated electrodes except for the electrode feed rolls and electrode guiding device. The mechanism includes a clamp for holding any standard stick electrode and for transmitting current to the electrode. The clamp is attached to the end of a feed rod upon which two feed rolls operate to maintain the proper arc voltage through automatic thyatron control. The electrode is accurately guided to maintain the arc in a predetermined location. Limit switches govern the extremes of movement in either direction.

To operate the equipment, the welding operator inserts an electrode in the clamp and presses the start button. The equipment then strikes and maintains the arc, feeding the electrode at the proper rate to maintain the pre-set arc voltage. Welding continues until stopped by a limit switch, at which time the electrode clamp returns to starting position to receive a new electrode.

When more than one joint is to be welded with one electrode, an additional limit switch is used for each intermediate stop.

complete joints can be made with a single electrode, such as in the welding of shells, wheels, and tubular assemblies where the starting and finishing ends of



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

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(In Canada: 444 Pacific Ave., Toronto, Ont.)

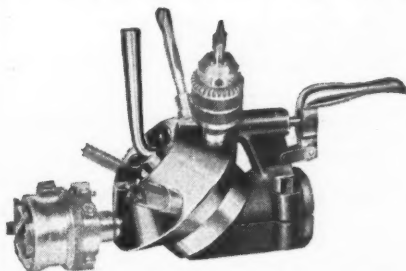
ENGINE LATHE TO TURRET LATHE IN 15 SECONDS

Don't wait for Turret Lathes . . . You can convert any engine lathe into a complete precision turret lathe in 15 seconds with the JEFFERSON 4-Tool Tool-Post Turret, 5-Tool Tail-Stock Turret and Adjustable Pull Feed — and double its capacity. For forming, roughing, boring, finishing, drilling, tapping, etc.

Adjustable Pull Feed eliminates slow movement of tail-stock spindle and provides easy control. For any lathe up to 24" swing.

DELIVERY, 15 DAYS.

Write for Details.



5-Tool Tail-Stock Turret accommodates five tools and each tool centers automatically when brought into position by means of an indexing plunger. Made in four sizes to fit small bench lathes up to lathes with 24" swing.

PATENT PENDING

4-Tool Tool-Post Turret carries four separate tools instead of one. Made in two sizes for standard O, OO, No. 1 and No. 2 tool holders.

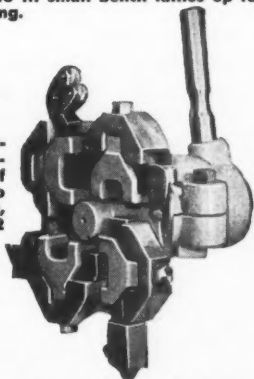
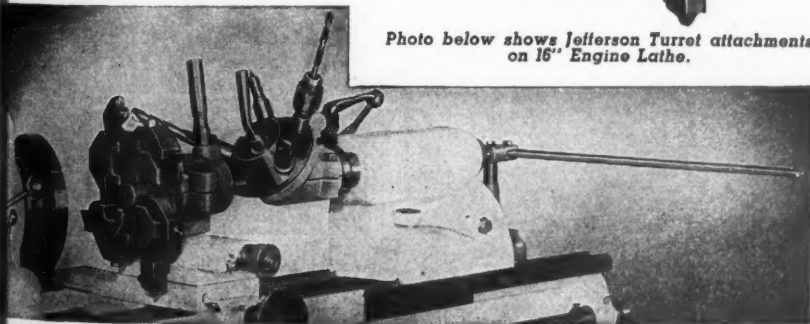


Photo below shows Jefferson Turret attachments on 16" Engine Lathe.



JEFFERSON MACHINE TOOL CO.
750 W. Fourth St., Cincinnati, Ohio

Tool-Post Turrets, Tail-Stock Turrets, Adjustable Pull Feeds, Belt Sanders, Gyrotray Foundry Riddles, Overhead Swing Frame Grinders, Milling Machines, Dividing Heads and Vises.

THREADWELL DOES IT!

THREADWELL LICKS TOUGH THREADING JOBS MAKING "FULL FORM" BRITISH TAPS

Many American industries are working on orders for Great Britain where British form of thread is required. Here at Threadwell all Whitworth, British Standard Fine and British Association High Speed Taps as small as No. 10 B.A. are ground with a true "Full Form".

For long life and accuracy these taps are unsurpassed. Their manufacture requires the highest standards of workmanship and the most modern equipment. Threadwell has both - - and will continue to turn out these "Taps of Distinction" in an all-out effort for final victory.

THREADWELL TAP & DIE COMPANY
Greenfield, Massachusetts, U. S. A.



SALES AGENTS:

Canada - BRIDGE MACHINERY COMPANY, Montreal.
England - SKYLUX, LTD., London.

Watson-Stillman No. 8661 1,300-Ton Forming Press

Designated as the No. 8661, a 1,300-ton forming press which can be adapted for single cycle automatic operation or manual control as required has been constructed by the Watson-Stillman Co.



Watson-Stillman No. 8661 1,300-Ton Forming Press

Roselle, N. J. The machine is entirely self-contained, including 50 h.p. motor and radial piston pump delivering 45 g.p.m. per minute. Control is by means of a single lever, latch-operated by pressure cylinder.

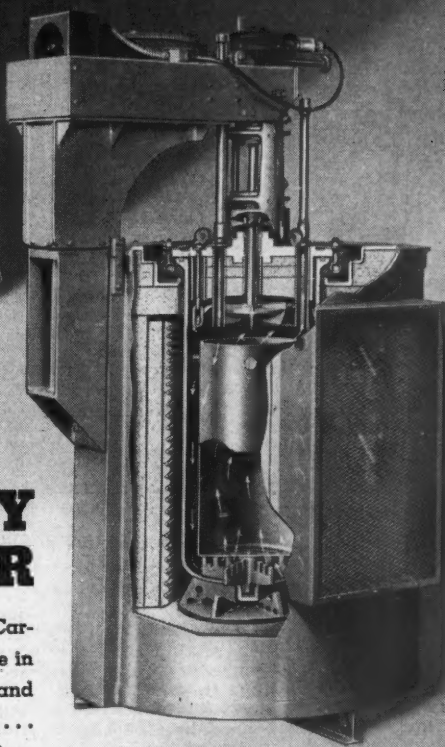
The press is of a vertical four-column type and is provided with an opening of 37 inches and clear platen area of

THE "INSIDE" STORY



of the **HEVI DUTY CARBURIZER**

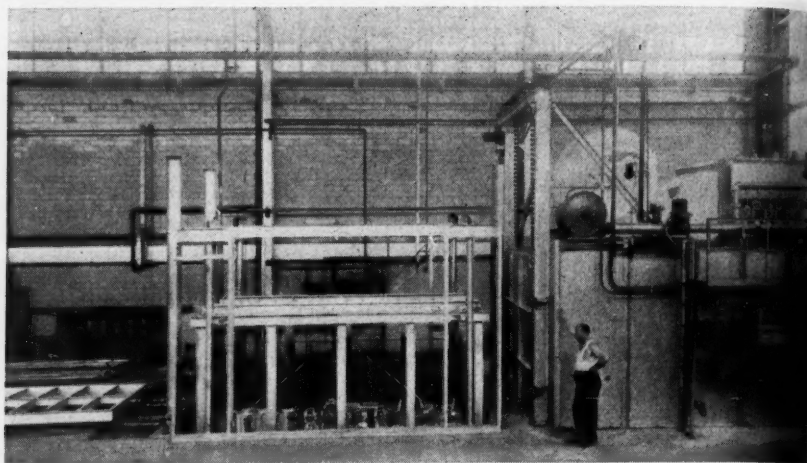
The "Inside" Story of the Hevi Duty Carburizer is the story of its national use in mass production of carburized parts, and of its flexibility for use in Nitriding... Bright Annealing and Clean Hardening. The "Inside" story of its design, durable construction and efficient operation is told in the new Hevi Duty Carburizer Bulletin HD-142 — Send for your copy.



Typical "Inside" view of the Hevi Duty Carburizer

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES **HEVI DUTY** ELECTRIC EXCLUSIVELY
MILWAUKEE, WISCONSIN



Despatch Aluminum Heat-Treating Furnace

x 42 inches. The 35-inch diameter ram of the press is provided with a stroke of 22 inches and has an advance and return speed of 650 inches per minute and pressing of 10.5 inches per minute.

The Watson-Stillman No. 8661 1,300-Ton Forming Press occupies a floor space of 8 x 6 feet, has an overall height of 19 feet, and weighs 80,000 pounds.

Despatch Aluminum Heat-Treating Furnace

An aluminum heat-treating furnace which is said to be capable of quenching 8,000 lb. of castings in 25 seconds is announced by the Despatch Oven Co., 622 9th St., Minneapolis, Minn. This fast

production made possible by the furnace is claimed to be due to the type of material handling system employed. A series of rollers are mounted in the loading section, on the top and in the interior of the elevator quench cage, and on the bottom of the furnace work chamber. The rollers are carefully aligned and form a level roadway from loading section to furnace whether quench cage is up or down.

In operation, a processed load is withdrawn by air winch from furnace elevator cage, then dropped quickly into quench bath. The waiting (raw) load is then pulled directly into the furnace passing over the quench bath on the series of rollers mentioned above.

The Despatch Aluminum Heat-Treating Furnace is a radiant tube convection type with indirect gas heater, and

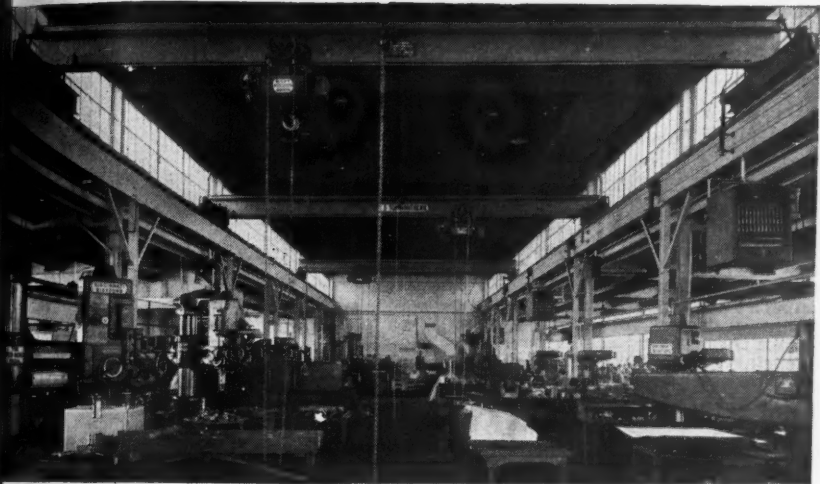
For LONGER LIFE from your TUNGSTEN-CARBIDE TOOLS USE **CARBOIL**

The genuine Diamond-Lapping Lubricant that contains no abrasive and may be used on both composition and metal backed diamond wheels. If your jobber cannot supply you, order direct from

CARBIDE TOOL ENGINEERING COMPANY

4439 LINCOLN AVENUE, CHICAGO, ILL.

Industry's Air Transport Northern Cranes and Hoists



For years industry has known what the army and navy are just discovering—that materials may be moved through the air with ease and dispatch.

Industry moves materials through the air with reliable cranes and hoists. Speed, safety, and clear pathways are always available.

Northern Cranes and Hoists are contributing much to industry's air transport in these busy times.

Northern Hi-Lift Hoists are built in 1000 lb. to 15-ton capacity—in single motor and two-motor types.

Write for New Catalog of Hi-Lift Hoists

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NORTHERN CRANE & HOIST WORKS, Limited • WINDSOR, CANADA

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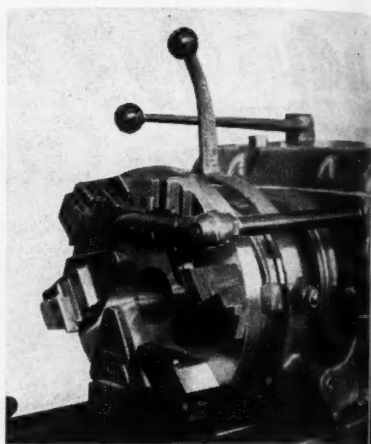
is designed for handling all types of aluminum or magnesium alloys. Heat flow from side ducts is both vertical and horizontal and passes outward through recirculating ducts. The work chamber is claimed to have a uniformity of ± 5 deg. F. and is provided with automatic temperature control.

The fan of the furnace is constructed of alloy steel and has a capacity of 20,000 cubic feet per minute. Also included as standard equipment of the furnace is a strip chart recording controller.

Lanco Type RXX Die Head

Designated as the Lanco Type RXX, a special die head which is said to be especially suitable for cutting large diameter, fine pitch threads where the length of thread is relatively short has been introduced by the Landis Machine Co., Waynesboro, Pa. The head has a capacity for threading an unusually wide range of work, this capacity being obtained through the use of an oversize closing ring on the face of the die head to support extended chaser holders.

The die head illustrated is equipped



Lanco Type RXX Die Head

with chaser holders and chasers for cutting 8 pitch threads on $9\frac{1}{4}$ -inch diameter work. However, by employing chaser holders with a still greater offset seating surface for the chasers, work as large as 12 inches in diameter can be threaded.



"CHATTERLESS" COUNTERSINKS

... Surpass Expectations

As a result of the shape and unique arrangement of their teeth, all Severance Countersinks take fairly heavy cuts, produce very smooth seats, and minimize the possibility of chatter.

Write for more information on "Chatterless"
Countersinks—Midget Milling Cutters—and
Tube Deburring Cutters.

SEVERANCE TOOL COMPANY

724 Iowa Avenue

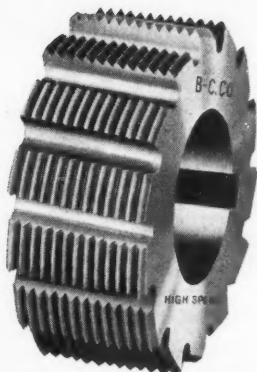
Saginaw, Michigan

Branch Plants

Long Island City, N. Y.
Detroit, Michigan

Los Angeles, Calif.
Chicago, Illinois

A Suggestion For Solving
a War Production Problem



Thread Milling Cutters of this type are generally designated as **MULTIPLE THREAD MILLS** to distinguish them from similar single type thread mills. Multiple Thread Mills are used for cutting all types of screw threads and offer many advantages both in accuracy and production. For example, the Multiple Thread Mill shown here is used to cut 12-pitch threads of different diameters in three places on these tractor clutch shafts (one end of which is shown).

ITEM:

USE BARBER-COLMAN UNGROUND THREAD MILLS

**GROUND THREAD MILLS ARE BEING
UNNECESSARILY ORDERED IN MANY CASES**

Check your specifications! In many cases, such as screw fastenings, bolt ends, and the like, where there is no problem of leakage, or for shells, fuses and bombs, it is unnecessary to order ground thread mills. Manufacturing facilities for ground thread mills are overloaded—capacity for making **UNGROUND** Thread Mills is available. Furthermore, Barber-Colman is now able to offer *Unground* Thread Mills, which, in 75% of manufacture, will produce work within the tolerances of Class III specifications! This is due to recent Barber-Colman research and progress in heat treatment, and is limited to cutters of 1" face or less. If you are in doubt about a particular job, call for our engineering consultation service.

ON THIS JOB, FOR INSTANCE...

Here is a case where Ground Thread Mills were formerly used and have now been replaced with Barber-Colman Unground Thread Mills, still maintaining the tolerances. The piece is a tractor clutch shaft with 12-pitch threads in three places (only one of which is shown). The cutter is run at 220 r.p.m. and production on the 1 1/4" dia. thread shown is 20 pieces per hour overage including inspection at the machine. Accuracy on the major diameter and pitch diameter is .005" and accuracy on the lead pitch is .0005". The cutter is 2 1/4" dia. by 1" face and gives 240 pieces per sharpening.



BARBER-COLMAN COMPANY

General Offices and Plant 207 Loomis Street, Rockford, Illinois, U. S. A.

BARBER
B-C
COLMAN

PRODUCTS

MILLING CUTTERS
MOST HOESING
MACHINES, HOE
HARDENING MA-
CHINES, REAMERS,
REAMER HARP-
ENING MACHINES,
SPECIAL TOOLS

The maximum thread length which can be handled with chaser holders of the type illustrated is approximately 2 inches.

According to the manufacturer, the Lanco Type RXX Die Head is now being used very successfully for threading components manufactured by the munitions industries. All operating parts of the die head are made of high carbon steel and are heat treated. The chaser holders are made from steel forgings, and since these holders are supported by the enlarged closing ring on the face of the die head, they provide an unusually rigid support for the chasers.

"Cerrosafe" Low Temperature Melting Alloy

To meet the need for a low temperature melting metal which may be used to accurately proof-cast cavities such as molds, gun chambers, forging dies, and so on, Cerro de Pasco Copper Corp., 40 Wall St., New York, N. Y., has added to its line an alloy to be known as "Cerrosafe."

The alloy can also be used as a filler behind delicate parts to be machined or ground in profiling or duplicating ma-

chines, for accurate molds for engraving machines where the pressure of the stylus is low, and for protecting wax core molds and patterns.

Cerrosafe is a mixture of bismuth, lead, tin, and cadmium and is completely molten at 190 deg. F. Weight of the alloy is approximately 0.35 lb. per cubic inch.

Vernon Vertical Milling Head

Especially designed for use on the Vernon No. 0 Milling Machine, a vertical milling head with integral motor drive and speed reducer is announced by Machinery Mfg. Co., 1915 E. 51 St., Vernon, Los Angeles, Cal. The head can be rigidly supported on the overarm of the machine and may be reversed, using the motor on either side. This reversing feature is said to extend the range of useful table travel approximately 3 in.

Complete 360-deg. rotation can be made in the vertical longitudinal plane and settings can be duplicated quickly by referring to the graduated dial which are included on both ends of the overarm housing. The transverse slides on a 3-inch pilot and can be rotated 25 deg. each side of vertical. G



WILLEY'S

STANDARD
CARBIDE

TOOLS

You can handle 90% of your requirements with Willey's General Purpose Tungsten Carbide Tools, which are suitable for machining cast iron, tough hard rubber, bakelite, fibre and tough alloy steels. Willey's General Purpose Tools give you low prices, increased production and lower operating costs. Prompt deliveries on these standard tools.



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Just Out
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1340 W. Vernor Highway, Detroit, Michigan

HOW TO KEEP YOUR PNEUMATIC TOOLS

on the Job

DON'T DO THAT
THE PLUNGER WILL
HIT THE RETAINING
WALL AND BREAK
THE CYLINDER

I'VE BEEN DOING
IT THIS WAY FOR
20 YEARS

YES AND YOU'VE
BEEN BREAKING
TOOLS FOR
JUST THAT
LONG



★ Don't run any pneumatic hammer without having a chisel or set in its proper place in the bushing. Likewise, don't run the hammer idle, with hand held over the end, or one finger inserted in the end bushing, to test it. This causes an invisible crack to start in the retaining wall, which later results in breakage.

BE SURE TO BLOW OUT THAT HOSE
BEFORE CONNECTING THE TOOL
— AND BE CERTAIN TO CLEAN THE
DIRT OFF THE NIPPLE BEFORE
SCREWING IT INTO THE HANDLE
BUSHING



★ Be sure to blow out the hose before connecting the tool. Also, don't screw a dirty, gritty, hose nipple into the air connection bushing.

★ ★ ★

Branch Offices in Principal Cities

★ Another in a series of advertisements telling how to get maximum work out of your tools, with minimum expense for repairs and compressed air. Send for the whole series, ask for "Cleco Cartoons."

THE CLEVELAND PNEUMATIC TOOL CO.
781 EAST 77th STREET CLEVELAND, OHIO



END MILL ARBOR

S. & A. End Mill Arbors are made of steel, unhardened, carefully fitted, accurately sized and are well known for their durability.

No. of Arbor	Type	A	B	C	D	Net Price Each
EA 10	MORSE No. 2	1 1/2"	4 1/2"	1-1/16"	3/8" & 1/2"	\$5.00
EA 11	MORSE No. 3	1 3/8"	4 3/4"	1 1/4"	3/8" & 1/2" & 5/8"	\$3.50
EA 12	BROWN and SHARP No. 7	1 1/2"	4 7/8"	1-1/16"	3/8" & 1/2"	\$5.00
EA 13	BROWN and SHARP No. 9	1 3/8"	5 7/8"	1 1/4"	3/8" & 1/2" & 5/8"	\$5.50
EA 14	BROWN and SHARP No. 10	1 3/8"	7 7/8"	1 1/4"	3/8" & 1/2" & 5/8"	\$6.00



SCHULTZ & ANDERSON CO.
MACHINE TOOLS

109 EDISON PLACE NEWARK, N. J.

uations 30 deg. each side of zero are accurately cut on the spindle housing, and all angular settings of the are accurately maintained by two hardened socket head cap screws. Squaring faces on the spindle housing provided for vertical positioning of the spindle in both planes.

The 1 1/4-inch spindle is made of steel, heat-treated and ground, and mounted in double row precision loaded ball bearings at the collet. These bearings are sealed with a spec-



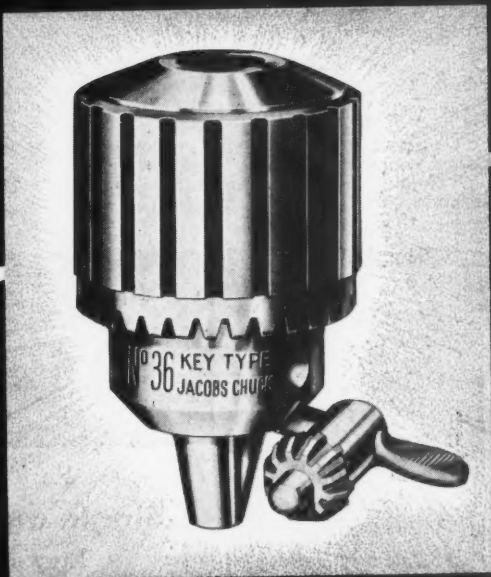
Vernon Vertical Milling Head

oil retainer of Saetan leather which effectively keeps lubrication in and foreign material out. Long bearing and oil retainer life is said to be assured even at high operating speeds. The bearing at the upper end of the spindle is a double row precision ball bearing type and is equipped with a Gits oiler for continuous lubrication of both bearing assemblies. Spindle speeds are 280, 525, 1,050, and 1,750 revolutions per minute.

The Vernon Vertical Milling Head is designed for use with special collets for quick ejection of cutters and tools. Collets are tightened by a large nut on the spindle nose, two wrenches being furnished for this purpose. Collet sizes furnished with the head are 1/4", 3/8", and

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Wherever metal-working
is in full swing,
there
you'll
find



THE NATIONAL STANDARD
FOR WAR PRODUCTION

IF IT'S A JACOBS***—IT HOLDS!

THE JACOBS MANUFACTURING COMPANY, HARTFORD, CONN.

inch. Special sizes of collets from $\frac{1}{8}$ to $\frac{1}{16}$ inch by 16ths are also available. Jacobs chucks and offset boring heads with $\frac{1}{2}$ -inch straight shank to fit $\frac{1}{2}$ -inch collet can also be furnished for use with the head if required.

The motor of the Vernon Vertical Milling head is a $\frac{1}{2}$ h.p., ball bearing equipped, 50-60 cycle, single phase, 110-220 volt unit which is supplied complete with built-in snap switch and cord. Motor speed is 1,750 r.p.m. on 60 cycle current. By loosening a knurled hand lock, the motor and speed reducer can be swiveled independently of the spindle housing to any convenient position. The speed reducing pulley is ball bearing mounted and supported in a yoke which is adjustable for regulating belt tension and quickly changing V-belts, and is locked in position by two knurled headed screws. All belts and pulleys are fully guarded.

Grind-All Grinding Concentrate

Designed to improve wet grinding finishes, a substance designated as Grind-All is now being manufactured by the Stadoil Mfg. Co., 617 S. Beacon St.,

Dallas, Texas. Grind-All is a concentrate which is used one quart to 50 gallons of grinding fluid, and is said to immediately miscible with all grinding solutions.

In use, Grind-All is said to prevent grinding wheels from becoming clogged, thus eliminating frequent shutdowns for wheel dressing and, at the same time, reducing the amount of pressure required by the wheels on the material being ground.

Keleket Radiographic and Diffraction Unit

The Keleket Radiographic and Diffraction Unit shown in illustration here-with has been developed by Kelly-Koett Mfg. Co., 2188 W. Fort St., Covington, Ky. The unit is designed to provide conventional radiography, the inspection of castings and microradiography for investigation of alloy compositions and other material and X-ray diffraction analysis for laboratory study of crystalline structures.

The construction of the Keleket Radiographic and Diffraction Unit permits

SHEAR-CUT HIGH SPEED END MILLS



Here's a complete line of
Single and Double End Mills.

They save time and money.
SPECIFY PROGRESSIVE SHEAR-CUT END MILLS.
Write for catalog and prices.

PROGRESSIVE TOOL & CUTTER CO.
2345 WOLCOTT ST. FERNDALE, MICH.

SHAFTS OR SHELLS - *Faster!*

SUNOCO EMULSIFYING CUTTING OIL

helps machine better war materials...in shorter time

Whether it's shafts or shells, axles or "ack acks," Sunoco Emulsifying Cutting Oil is proving a production stimulant for all machining operations requiring an emulsifiable cutting oil.

Sunoco is increasing tool life. Exceptionally high heat-absorbing properties preserve the cutting edge of tools...permitting longer operating periods between tool grinds, fewer "time outs" for tool changes — more production per shift.

Sunoco is making possible greater feeds and speeds. Because of the excellent heat dissipation, increased speeds and feeds can be

utilized on many operations...producing more pieces in shorter time...with no sacrifice in accuracy or finish.

Sunoco is reducing rejects. Maintenance of close tolerances, smoother finishes, fewer tool set-ups...oil combine to cut rejects to a minimum.

Sun Doctors of Industry — experienced metal-working experts — are ready, willing and able to show you how Sunoco can speed your war production. Call one in today. For examples of how they are helping others, get your copy of "Helping Industry Help America." Write



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SUNOCO

PETROLEUM PRODUCTS

HELPING INDUSTRY HELP AMERICA

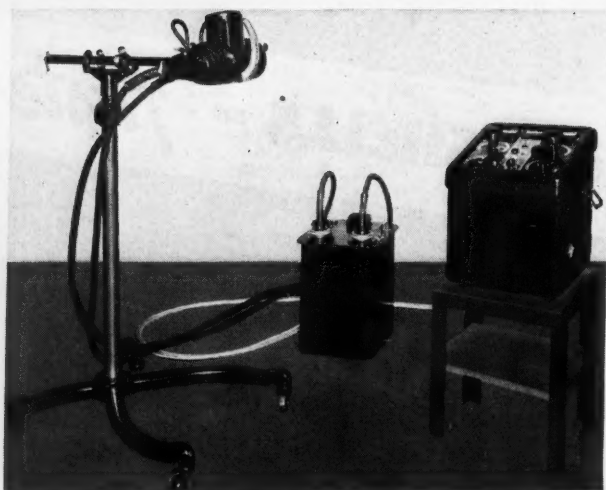


Fig. 1 — Keleket Radiographic and Diffraction Unit

several types for specific applications, with Machlett Type CYS tubes for conventional radiography. Receptacles of the transformer are designed to accommodate shockproof cables for either type of tube, thus affording a safe, compact and flexible installation.

The Keleket Diffraction Unit makes it possible to peer into the very composition of matter and visualize the arrangement of molecules

the use of voltages from 10,000 to 100,000 for radiography and from 5,000 to 50,000 for diffraction analysis. The unit is said to be especially suited for use with Machlett diffraction tubes, available in

Illustration Fig. 2 shows three diffraction patterns taken of one sample of steel. The pattern on the left indicates that the molecules are arranged in haphazard fashion and are under great strain. After

YES — WOMEN OPERATORS TOO CAN DO FAST, ACCURATE TAPPING

on this

Ettco-Emrick

FOOT-OPERATED
TAPPING
MACHINE

The skill usually needed in tapping is built into this machine with its hair-trigger sensitive friction clutch and sensitively counter-balanced foot pedal. All the operator has to do is place the work and step on the pedal. That's why practically any operator, male or female, can maintain a production of **2400 accurately tapped holes per hour** with the standard 2-spindle head—and up to **12,000 holes per hour** with available Ettco-Emrick Multiple Tapping Heads. BULLETIN No. 4 gives full details about the Machine and BULLETIN No. 3 covers the Multiple Tapping Heads.

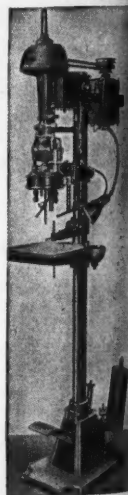
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ETTCO TOOL CO., Inc.

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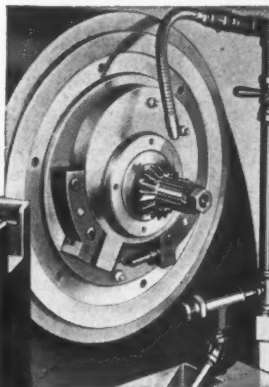
MAKERS
OF

Ettco-Emrick

DRILL CHUCKS • TAP CHUCKS • TAPPING ATTACHMENTS
MULTIPLE TAPPING AND DRILLING HEADS • TAPPING MACHINES

PRODUCE PRECISION Internal or External THREADS... FASTER

Below is shown set up for internal threading, the milling hob is revolved eccentrically about the work and simultaneously rotated into the work for the full depth of the thread. The cutter then rotates on its own axis and is carried around the work and simultaneously advanced by means of a lead screw to produce the desired helical thread.



with the

NEW MURCHEY No. 32 THREAD MILLING MACHINE

Featuring a unique eccentric milling action described above, the new Murchey Thread Milling Machine is setting new records for speed and precision in the production of munitions threads. For example, on one job it is cutting a 2-7/16" thread in the base end of anti-aircraft shells faster than one a minutel Internal or external threads from 1" to 4" in diameter and up to 3" in length. Maximum efficiency in operation is obtained through the completely hydraulic work cycle and the Reeves variable speed drive which permit the selection of exactly the right speed and feed for every job. And in the cutting of deep, coarse threads, the heavy box-type bed and the keyway in the fixture table help to maintain rigidity and perfect alignment. If you are looking for increased speed and maximum accuracy in munitions and aircraft threading, let us send you further details of the latest Murchey thread production equipment.

Below is shown the spinning nose equipped with a hardened and ground 12" after thread milling head for cutting external threads on 1" up to and including 4" in diameter. The same eccentric milling action is employed as in the milling of internal threads described above.

We also manufacture all types of Collapsible type, Self-Opening Die heads, Bolt and Pipe Threading Machines and Pipe Cutting-Off Machines.

THE MURCHEY MACHINE & TOOL COMPANY
951 PORTER STREET, DETROIT, MICHIGAN

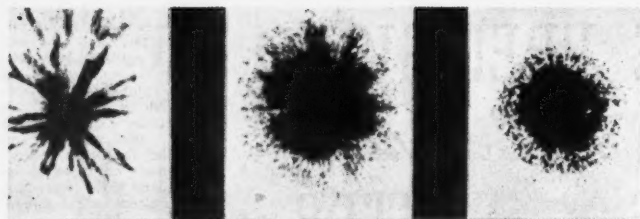


Fig. 2 — Illustration showing three diffraction patterns taken on one sample of steel by means of Keleket Radiographic and Diffraction Unit

partial annealing, the middle pattern is obtained—the molecules are rearranging themselves in more symmetrical fashion. After complete annealing, the pattern on the right is obtained which indicates that all strain has been relieved.

Readily portable, the Keleket Radiographic and Diffraction Unit can be moved anywhere in the plant and used inside fabricated assemblies. The unit is easily adaptable for stationary or assembly line inspection or research work in the laboratory.

Studebaker Hydraulic Drilvise

A hydraulic vise designed for holding work on all types of drill presses, plan-

machines, to be known as the "Drilvise," has been placed on the market by the Studebaker Machine Co., 9 E. Clinton St., Chicago, Ill. The vise is automatic in operation and is entirely foot controlled, thus permitting use of both hands in operating machine to which unit is applied and in setting up and removing work from the machine. The usually powerful, the vise is designed to exert a pressure in excess of 10,000 lb. per square inch between the jaws and is of sufficient weight to permit many jobs to be handled without bolting or clamping vise to machine table.

The Studebaker Hydraulic Drilvise is self-sufficient, requiring no outside power or air supply. The unit consists of a conventionally-shaped drill press vise but without usual screw or handle, and

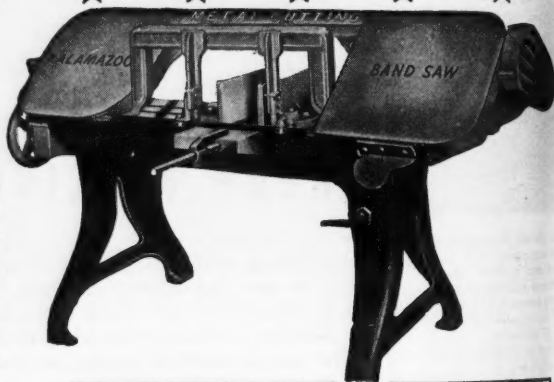
ers, shapers, milling machines, surface grinders, lathes, and other

UP

PRODUCTION
WITH A
KALAMAZOO

Make your rough cuts within thousandths of an inch! Save precious machine time, save valuable steel. A Kalamazoo Metal-Cutting Band Saw gives you this kind of accuracy to boost production! Sturdy design, ball-bearing construction, hydraulic controls. Completely portable—saves set-up time. Cuts all shapes!

Write for specifications.

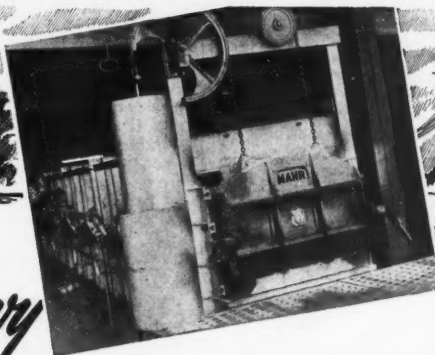


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DELIVERIES**

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AVAILABLE!**

MACHINE TOOL DIVISION
KALAMAZOO TANK & SILO COMPANY

507 HARRISON ST.
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Our Navy

GIVES 'EM "HEAT TREATMENTS" *plenty*

On the seas, it's our armor plate versus bombs, shells, torpedoes—and vice versa! Our Navy is manned by men of courage, high morale, GUTS! They deserve the toughest armor plate (and the best arms and shells) in the world—and they're getting them . . . We like to feel we're really giving the Japs "heat treatments", with hundreds of MAHR Furnaces in use 24 hours a day, carburizing armor plate for greatest strength and toughness—and with many other kinds of accurate heat treatments helping to perfect every type of steel needed on America's warships . . . The modern science of heat treating metals is receiving its fullest expression and creative development in . . .

MAHR FURNACES

For Every Heat Treating Need

ANNEALING, CARBURIZING, BAKING, HARDENING,
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ROLLER HEARTH
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ROTARY

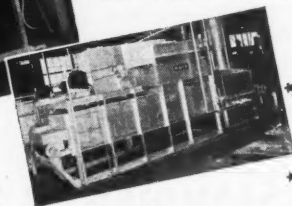
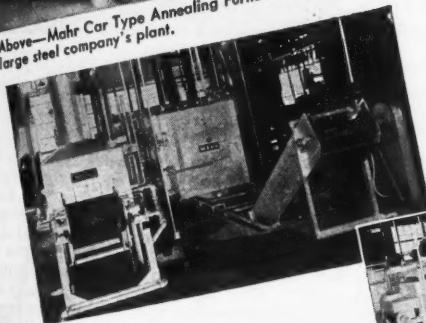
Other MAHR Equipment:
RIVET FORGES
TORCHES
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BLOWERS
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SMITHING FORGES

Call in a MAHR Engineer — he can help you on any heat treating problem . . . Wire, write, or phone today.

At Left—Two views showing installation of Mahr Hardening and Drawing Furnaces in the plant of a large tool manufacturer.



Above—Mahr Car Type Annealing Furnace in large steel company's plant.



MAHR MANUFACTURING CO.
DIVISION DIAMOND IRON WORKS, INC.

GENERAL OFFICES: MINNEAPOLIS, MINNESOTA — SALES OFFICES IN PRINCIPAL CITIES

* * *
* **Save ALL**
your scrap!
Buy MORE
War Bonds!
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Not Affected
BY OIL OR HEAT



DE-STA-CO ARBOR SPACERS

Made of metal, these spacers are not affected by oil or heat . . . may be used over and over again, thus cost per time used is low.

Use De-Sta-Co Spacers for quick set-up of milling machine cutters and wherever low cost, accurate spacing is required. Stock sizes .001" to .125" thick.

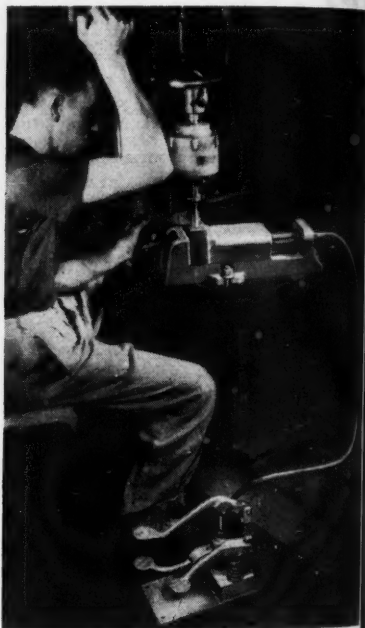
Specials, any length, cut from bar stock, ground to decimal. They save a lot of time for you.

TRIAL ASSORTMENT—enough for average use on one machine sent for \$1.00. Give arbor size.

Size and price list sent **FREE!**

DETROIT STAMPING CO.
Established Over 25 years
349 Midland Ave. • Detroit, Mich.

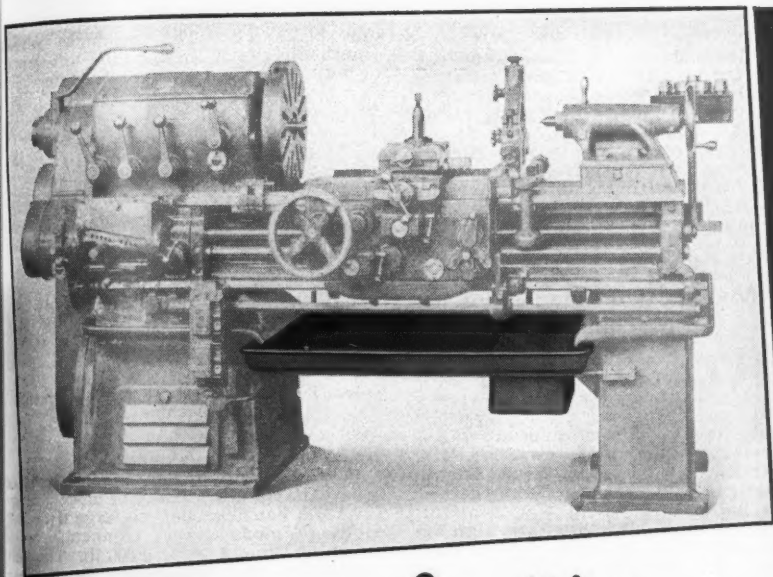
a hydraulic foot control base connected to vise by a 6-foot length of flexible rubber tubing. The vise and control base are semi-steel castings and are readily portable. The vise is provided with hardened steel jaw plates which are held in place by two 1¼-inch, 28 thread machine screws and can be easily removed or replaced with special jaw faces. Jaw faces are aligned for 0.001 inch accuracy. In addition, the vise is provided with cross slots and side cam



Studebaker Hydraulic Drillvise

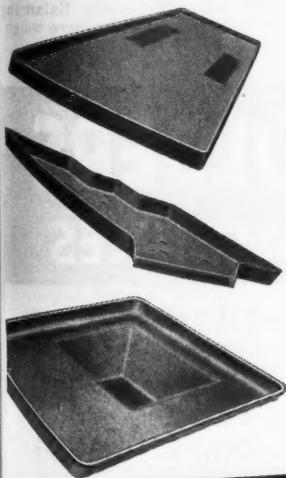
for bolting either lengthwise or across work table.

In operation, the work is placed between the open jaws of the Drillvise and the operator moves the rear jaw toward the stationary front jaw by depressing with one stroke the middle pedal of the foot control, thus exerting just the right amount of pressure to only grip the work. The right or booster pedal when depressed moves the jaw a maximum of 1/8 inch at each downward stroke of the foot and exerts a maximum nonslipping pressure of 10,000 lb. per square inch. To release the work, the left pedal of the control is depressed with one down



Precision **LATHE PANS**

Now it's possible to secure Precision Lathe Pans ready to be put into place. Littleford's 60 years experience in the fabricating of such units is your assurance of quality workmanship. Send in blueprints for prices and delivery data. Skilled workmen and modern equipment keep prices low and cut time in production. Littleford can speed up your war task, so send in blueprints today.



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433 E. Pearl St.,

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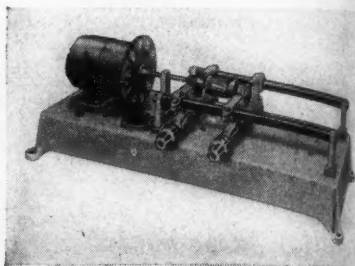
ward movement of the foot.

Specifications of the Studebaker Hydraulic Drilvise are as follows: width of jaws, 6 inches; depth of throat, 3 inches; size of vise, 30 inches long x 8 $\frac{1}{4}$ inches wide x 5 $\frac{1}{4}$ inches high; weight, 74 lb.; size of foot control, 11 inches high x 10 $\frac{1}{2}$ inches wide x 14 inches long; weight, 36 lb.; total shipping weight, 120 pounds.

Bear Dy-Namic Balancing Machines

A line of dynamic balancing machines for use in balancing such rotating parts as armatures, fans, blowers, flywheels, hubs, drums, propellers, gears, impellers, pulleys, wheels, rotors, and so on, is now being marketed by the Bear Mfg. Co., Industrial Division, Rock Island, Ill. Designed for easy operation, the machines indicate the disturbing centrifugal force or force couple with a high degree of accuracy. Both the angular position and the value or amount of unbalance are shown at the same time. With the machines, parts need not be static balanced before a dynamic balance test

can be made. The machines reveal whether a static or dynamic unbalance or both, is present without reversing end



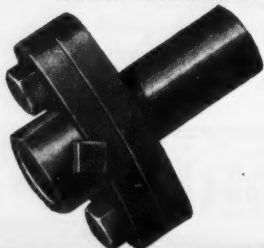
Bear Bench Model 335 Dy-Namic Balancing Machine

of the body being balanced.

Bear Dy-Namic Balancing Machines are available in a variety of models ranging from bench models to large floor and pit-type models for balancing work weighing from 6 oz. to 1,000 lb. The unit shown in the illustration is a Bear Bench Model 335 Dy-Namic Balancing Machine for balancing workpieces weighing from 6 oz. to 20 pounds.

FLOATING HOLDERS for SCREW MACHINES

Now Available for DEFINITE DELIVERY



	Our No.	
B & S No. 00	- No. 1	\$6.00
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as developed by our Engineers
Designers and Builders of Fine Machine Tools

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**Federal
Taperlock**

GAGE HANDLES

Made of plastic durable material, Federal Taperlock Gage Handles are lighter than aluminum or any other metal generally used for gage handles.

Light weight makes them more sensitive to touch and reduces fatigue caused by long continuous use, particularly in the case of women inspectors. Plastic insulates from bodily heat, helping safeguard accuracy.

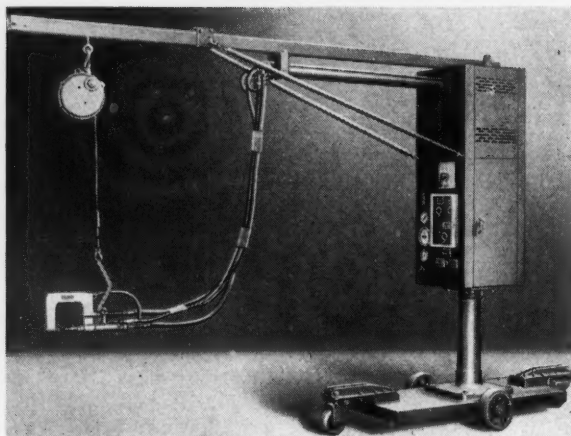
Made to conform to dimensions accepted as standard for Gages throughout the industry. They are marked for identification with the same lettering stamps used for marking metal handles.

The cost is low . . . about half the cost of metal handles. Available in 6 standard sizes, in any quantity and without delay.

FEDERAL TOOL CORPORATION

404 NORTH LEAVITT STREET

CHICAGO, ILLINOIS



Sciaky P-1-R Buggy-Mounted
Radial Spot Welder

Sciaky P-1-R Radial Spot Welder

A radial-type gun spot welder designated as the P-1-R is now being offered by Sciaky Bros., 4915 W. 67th St., Chicago, Ill. Available in both stationary and buggy-mounted models, the unit is equipped with a special Sciaky welding

timer and operates on single phase alternating current, 220 or 440 volts. Hydraulic pressure is supplied by a hydro-pneumatic booster which feeds a gun capable of providing a maximum electrostatic pressure of 1,800 lb. with 90 p.s.i. air supply.

Fixed or crowded jobs can be easily reached by means of the portable buggy-mounted welder shown herewith. The maximum area covered by the stationary unit is represented by a circle of 21 feet in diameter. The secondary cables of the P-1-R welder are thin, flexible, and short; the reduction in the usual size of secondary cables is made possible through the use of fixed heavy water-cooled copper bars located the length of the secondary circuit.

The Sciaky P-1-R Radial Spot Welder



FOR PRECISION • STRENGTH SPECIFY MAC-ITS

Mac-its are heat-treated to multiply the strength of every ounce of steel used in them. Designs that take advantage of these stronger screws save man-hours, machine-hours and metals.

THE STRONG, CARLISLE & HAMMOND CO.
1392 West Third St., Cleveland • Ohio

Industry Has Turned to SUNNEN PRECISION HONING

**For Speed—Accuracy—
and Super-Smooth Finish**



★ Close tolerances—super-smooth finish for perfect functioning of parts, while important to other industries, are vital throughout the field of aviation.

That's why hundreds of leading producers of war equipment, munitions, the manufacturers of aviation instruments and controls, have adopted Sunnen Precision Honing for sizing and finishing internal cylindrical surfaces from .185" to 2.400"—quickly, accurately, and at a lower cost.

Does Not Require Skilled Labor

Workers in "teens" can handle jobs in "tenths" after a few hours' instruction and practice!

This practical, inexpensive, economical machine can be set up and work located in one minute. Size adjustment can be made while machine is in motion with work on mandrel. When expensive reamers or broaches get a little undersize, many manufacturers remove the last thousandth or so with the Sunnen Precision Hone. Relieves big internal grinders for other jobs.

Corrects errors of out-of-roundness or taper caused by previous operations. Maintains alignment. Facilitates duplication of sizes.

In plant after plant, the Sunnen Precision Hone is showing production increases of 100% to 500% with corresponding savings in costs. For faster, lower-cost honing of small diameters, put Sunnen equipment to work in your plant.



Write for FREE BULLETIN

—giving complete information. Or if you prefer, a Sales Engineer will call and demonstrate this equipment in your plant on your job.

SUNNEN PRODUCTS CO. • 7933 Manchester Ave., St. Louis, Mo.

SUNNEN

Canadian Factory: Chatham, Ont.

Typical Examples

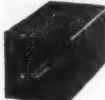
As you can readily appreciate, we cannot publish detailed information on Sunnen "success stories." However, here are a few general examples of the type of aviation parts being handled on the Sunnen Precision Hone.



Aluminum Aircraft Link "produces high finish without bell-mouthing."



Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.



Saved time in producing a smooth, accurate finish on this bronze remote control valve body.



Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



Hardened Steel Ring Gauge—finished to an accuracy of .000025" for roundness and straightness.

is capable of welding, under steady production conditions, corrosion-resisting steel, pickled steel, zinc-coated steel, and Monel metal in thicknesses of from 0.016 inch plus 0.016 inch up to 0.064 inch plus 0.064 inch. The unit is also designed to weld two unequal thicknesses up to a total welded thickness of 0.500 inch provided that one of the two thicknesses does not exceed 0.040 inch.

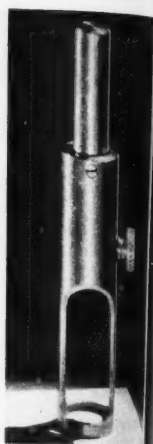
In welding pickled mild steel or standard steel, a speed of 180 satisfactory spot welds per minute can be obtained on thicknesses up to 0.032 inch plus 0.032 inch. The speed decreases as the sheet thickness increases.

"Center Master" Locating and Centering Tool

An unusual type of locating and centering tool which is said to be particularly effective in accurately centering layouts to spindle has been announced by the Center Master Division of the Center Scope Instrument Co., 351 S. La Brea Ave., Los Angeles, Cal. The tool, which is known as the "Center Master," is designed to reduce to a minimum the

number of steps required in locating and centering work to spindle axis. The tool is said to provide unusually accurate locating and centering, since the design includes a knurled trimming screw for compensating spindle and adapter runout and permits the operator to easily center work lines between the scribed lines on the locating glass.

Simple in construction and designed for easy and accurate operation by inexperienced workmen, the Center Master Locating and Centering Tool is 3 1/4 inches long overall and is provided with a 3/8-inch spindle shank, 1 inch long. The tool is supplied packed in wooden box.



"Center Master" Locating and Centering Tool



Rawhide



... and the hide of the Java Water Buffalo such as is used in Chicago Rawhide Hammers and Mallets is the toughest and the most enduring of all. These fine tools in sizes from 2 ounces to 6 pounds are not only long-lasting but are made to strike thousands of blows accurately and safely without damaging surfaces or materials from delicate wire insulation to heavy duty yet precision made crankshafts. At your dealers.

CHICAGO *Rawhide* MFG. CO.
1281 ELSTON AVE. ★ CHICAGO, ILLINOIS

★ ★ ★ ★

Another forward step in clamping operations! In fact, four forward steps—each contributing a definite speed factor in production.

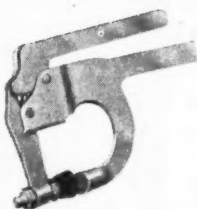


★ **MIDGET CLAMP.** Improved Model. Toggle bar strengthened, with bolt retainer now integral with bar. Spindles uniformly centered. Exceptionally practical in holding small parts where heavy clamping pressure is required. Spindle has rubber cap.



★ **PARALLEL CLAMPING PLIERS.** The extended parallel jaws aid clamping efficiency by exerting pressure uniformly over greater area. Particularly effective in gluing plywood. Two-spindle adjustment. Already extensively used in aviation industry on plywood gliders and training planes.

★ **L-CLAMP.** Designed for clamping small parts, either in assembly or production jobs. For use in limited spaces or where large throat capacity is required, such as in the clamping of L-sections in aircraft construction. Handles at right angles to clamping position.

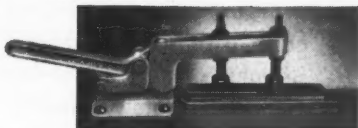


★

4 More

GNU-VISE FIXTURES

To Speed Up
Your Clamping
Operations



★ **U-SHAPED TOGGLE BAR.** Permits simultaneous clamping of many parts regardless of their thickness. Two spindles with rubber caps, adjustable horizontally and vertically, are pre-set at required locations and remain in these fixed positions during continuous operations. Handle in horizontal position when closed.

Perhaps YOUR plant can make advantageous use of one of these or other Knu-Vise features. Ask for a demonstration in your plant.

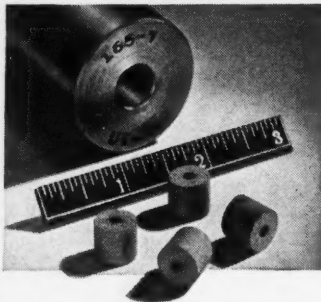
GNU-VISE
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2211 Eighth Street • DETROIT, MICH.
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DIAMOND WHEELS
RESINOID
BONDED

SECOMET



FOR CARTRIDGE DIES

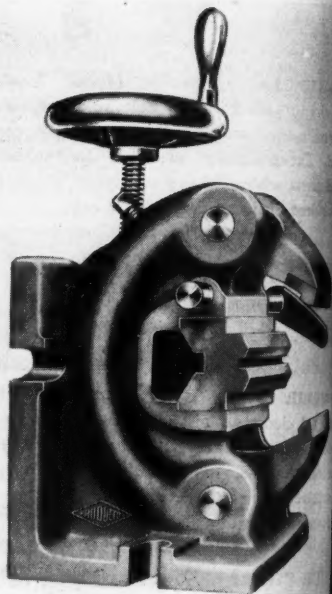
JKS resinoid-bonded Diamond Wheels for internal grinding of tungsten steel cartridge dies, produce straight holes of mirror-like finish — accurately, speedily and economically. Roughing and finishing wheel diameter 7/16 in.; length 3/8 in.; bore 1/8 in. Special sizes to order. Consult a JKS representative or write for folder.

Prompt deliveries

157 Chambers St.
New York
N. Y.
J.K. SMIT & SONS, Inc.

Producto Self-Centering Shaft Vise

The Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn., is now manufacturing the self-centering shaft vise shown herewith for use in holding spindles or shafts for keywaying, slotting, or splining. The vise is provided with two bases for vertical or horizontal mounting on machine table, both bases being accurately machined at right angles and equipped with keys for loca-



Producto Self-Centering Shaft Vise

ing purposes. Work is centered and held against a hardened V-block of equal movement of two jaws controlled by handwheel.

The Producto Self-Centering Shaft Vise is designed to handle shafts or spindles from 3/8 to 3 1/8 inches in diameter and of any length. An adjustable stop for locating work lengthwise is provided on the vise. The V-block is reversible for small and large work.

Specifications of the vise are as follows: size of bases, 8 x 7 1/4 inches; V-block, 4 1/2 inches wide; center height—vertical, 5 inches—horizontal, 4 3/8 inches; weight, approximately 80 pounds.

How BARNES "Know-How" Helped Keep Our Ship Program Ahead of Schedule!



A famous old Eastern shipyard was cutting six-inch bronze on an old-type machine. For years saw life had been getting progressively worse on this job until, when the Barnes man was finally called in, blades were lasting only 12 minutes.

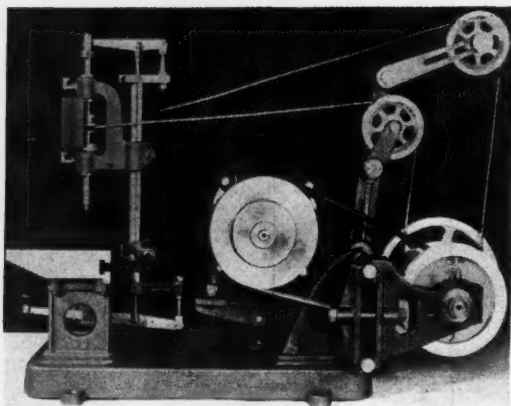
The Barnes man pointed out that bronze alloy specifications have been growing harder in recent years. He advised transferring the work to a newer machine, while reserving the old one for aluminum. Blades now last about eight hours.

Making blades *work* is as important to Barnes as making them well. Barnes blades are recognized in industry for their uniformity.

When you need any staple industrial product, call your Mill Supplies Distributor.

W. O. BARNES CO. INC.
DETROIT MICHIGAN

A Barnes Blade is Better



Lord & Davis Super Sensitive High Speed Drill Press

The Edward Blake Co., 634 Commonwealth Ave., Newton Centre, Mass., has brought out the Lord & Davis Super Sensitive High Speed Drill Press shown herewith which is especially designed for use in watch and instrument mak-

Lord & Davis Super Sensitive Speed Drill Press

ing. The machine is provided with eight standard spindle speeds from 3,000 to 23,000 r.p.m. for handling drills from 0.004 in. smaller, to $\frac{1}{8}$ inch in diameter. Sensitivity is attained by balancing the spindle by means of the vertical component of the belt tension. The sensitivity plus convenient finger-tip control, is said to reduce drill breakage to a minimum.

The Lord & Davis Super Sensitive High Speed Drill Press is available with one, two, three, or four spindles. Each spindle is furnished with an independent finger-tip control and may be operated at an independent speed to suit the size and type of tool being used and the material to be cut. Standard equipment of the machine includes two spindles for each spindle mount—one for Jacob chuck and one with tapered hole for tapered shanks.

HARTFORD "SUPERSPACER" FOR VERSATILE SPACING

Very accurate multi-splines are being slotted in heat-treated steel in this illustration. A special holding fixture is mounted on the face of the chuck.

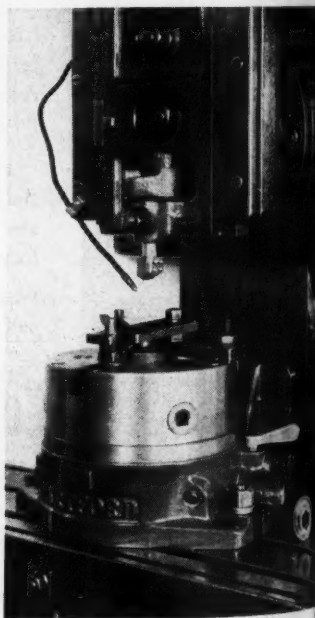
The HARTFORD "Superspacer" is more rigid and more rapid in operation than the conventional dividing head. It can easily be set up for one piece or thousands. Interchangeable mask plates make errors impossible on divisions of 2, 3, 4, 6, 8, 12 and 24.

Write for complete specifications and illustrations of milling, drilling, grinding, jig boring, planning, slotting and boring operations.

THE HARTFORD SPECIAL MACHINERY CO.

HARTFORD

CONNECTICUT





YOU CAN DO IT

Faster

IDEAL

Here are a few of the many IDEAL products which are helping to speed vital war production.

IDEAL LIVE CENTERS

Turn Heavier Loads Faster

Get more work, quicker, out of lathes, millers, grinders, etc. Machines take deeper cuts at higher speeds, because the IDEAL Live Center rotates with the work. Saves set-up time. It's fitted with high precision radial ball bearings and taper roller thrust bearing.

TRIPLE DUTY

3 Interchangeable Center Pieces.

For all centered and uncentered work.

IDEAL MARKING TOOLS

Prevent production delays due to theft, mistakes, confusion.

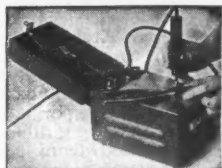
ELECTRIC MARKER

Permanently marks all materials; glass, metals, ceramics. Used like a pencil. Makes 7,200 cutting strokes per minute.



ELECTRIC ETCHERS

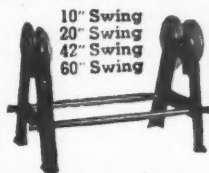
Permanently mark iron, steel and their alloys. New "Machine Shop" model has 14 etching heats. Other models for fine or heavy-duty etching.



IDEAL

BALANCING WAYS

Speed up balancing of pulleys, fly-wheels, etc. No time wasted finding centers. No leveling or set-up required.



10" Swing
20" Swing
42" Swing
60" Swing

FREE MACHINE TOOL ACCESSORY CATALOG

Gives information on these and many other time-saving tools.

IDEAL COMMUTATOR DRESSER COMPANY

1031 PARK AVENUE SYCAMORE, ILLINOIS

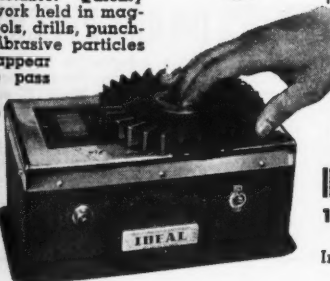
Sales Offices in All Principal Cities
In Canada: Irving Smith, Ltd., Montreal, Quebec.

IDEAL

DEMAGNETIZER

Keeps Tools Sharp Longer

Powerful — portable. Quickly demagnetizes work held in magnetic chucks, tools, drills, punches, etc. Abrasive particles automatically disappear after a single pass across the magnetic poles. Small tools, large parts. Demagnetized tools cut faster because they do not get hot, heat and cool quickly.



Gorton Model A-E "Spitfire" Arc Etching Machine

Designated as the Model A-E "Spitfire," an arc etching machine for permanent marking of parts, tools, and so on, has been developed by the George Gorton Machine Co., Racine, Wis. The machine can be used for either high production etching or individual marking of metals, including hardest steels. Due to an exclusive extension arm design, the machine can be used for etching in inaccessible places, such as inside a cylinder, cavity, or along both sides of a V-block. The unit is adaptable to etching an almost endless variety of sizes and contours of work, such as gears, connecting rods, gages, hardened pins, bushings, collets, and so on. It is said to be especially useful for marking unusually delicate parts, such as those made of 0.0015 inch feeler gage stock.

According to the manufacturer, the Gorton Model A-E Spitfire Etcher can be used to perform light or deep etching operations on flat or irregular surfaces, concave or convex curvatures at a speed of 120 arcs per second without the use of a forming guide. Etching depth can be controlled from 0.0001 to 0.003 inch by means of a single dial. Etching width can be varied from 0.0075 to 0.015 inch, depending upon the diameter of electrode used. Characters can be varied in height from $\frac{1}{8}$ inch to larger sizes.

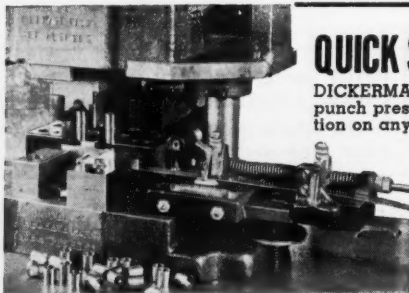
The Model A-E is designed for operation on 110-120 volts, 60 cycle alternating current. Etching voltage is stepped

Gorton Model A-E "Spitfire" Arc Etching Machine



down and is variable from 3 to 9 volts. Maximum current consumption is 250 watts. Designed for quick setups, the machine, it is claimed, can be readily operated by unskilled workers after a few minutes' reading of the simple directions and practice.

The Gorton Model A-E Spitfire Arc Etching Machine is furnished with a choice of 3 to 1 or 6 to 1 fixed ratio pantograph. Areas covered by the electrode point of the 3 to 1 fixed ratio pantograph include circles up to 5 inches in diameter, a $4\frac{1}{2}$ x 5-inch rectangle, and 4 x 8-



QUICK SET-UPS ON ANY PUNCH PRESS

DICKERMAN Hitch Feeds are adaptable to any ordinary punch press without press alterations. Feeds from any position on any style die... from zero to its limit (2" on 2" Hitch Feed and 4" on 4" Hitch Feed) for each stroke of the press.

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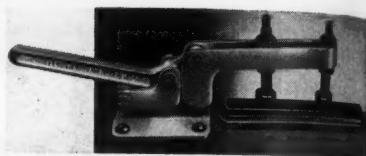
American Swiss SWISS-PATTERN FILES

long strip. Areas covered by the electrode point of the 6 to 1 fixed ratio pantograph include circles up to 3 inches in diameter, a 2½ x 4-inch rectangle, and 2 x 5-inch long strip.

The etcher unit, which consists of etcher head and control panel located in 7½ x 14½ x 10½-inch carrying case, can be obtained separately for use with conventional pantograph machines of all types. The unit is supplied complete with built-in transformers, switches, cables, pilot light, extra wire, and tube of 36 electrodes in assorted sizes.

Knu-Vise Clamp with U-Shaped Toggle Bar

Designed to permit the simultaneous clamping of small parts regardless of their thickness, a clamp with U-shaped toggle bar is announced by Knu-Vise, Inc., 2201 Eighth St., Detroit, Mich. The slotted toggle bar permits free horizontal movement of the two rubber-capped clamping spindles of the device for positioning them over the work. Once adjusted for a job, these spindles are said to remain in their respective fixed positions until the job is completed. The



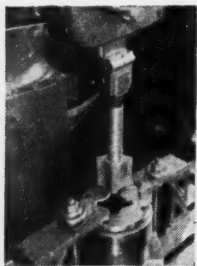
Knu-Vise Clamp with U-Shaped Toggle Bar

same degree of pressure is said to be obtained in repeating clamping operations. A simple flip of the handle is that is required to either clamp or release work.

Ideal No. 18 "Machine Shop" Metal Etcher

Designated as the Ideal No. 18 "Machine Shop" Metal Etcher, an etching device for permanently marking items of steel, iron, and their alloys is announced by the Ideal Commutator Dresser Co., 4004 Park Ave., Sycamore, Illinois.

To etch small tools or parts, the parts are simply placed on the 4 x 7-inch work plate provided with the unit and a switch



Thumbnail illustrates set-up for lapping.



Conventional set-up on round over-arm milling machine.

SLOTMASTER can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other. The stroke of the ram is adjustable from 0 to 4" ... the speeds range from 50 to 2500 s.p.m. The tool holder of the clapper box type, can be turned in any position. All the working parts are of heat steel heat treated and ground to close tolerances. SLOTMASTER comes complete with pulleys, motor, belt mounting adaptable to round over-arm or flat-on-round over-arm milling machines.

Send for 4-page catalog giving the specifications of the milling machines that will wish to equip. Immediate deliveries on high priorities.

Eliminates Hand Lapping

CASE HISTORY—NUMBER 4

Lapping of intricate H.S.S. compression dies, with a Universal Slotmaster requires a man's time only while setting up the job. The operation is started by lowering the lapping arbor to the mouth of the die opening and then setting the down-stroke of the slotter so that it will completely compress the spring, which is mounted between a shoulder on the shank of the lapping arbor and the tool holder. The spring then gradually relaxes

and the lapping arbor works its way into the opening as a result of spring pressure and the stroking of the slotter. When the spring is completely relaxed—the down-stroke of the slotter is again set up to completely compress the spring and the operation is repeated until the full length of the opening in the die has been lapped.

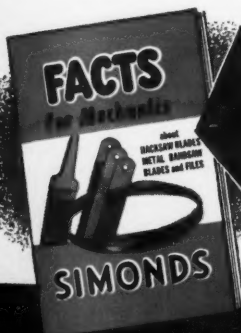
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DETROIT, MICHIGAN**

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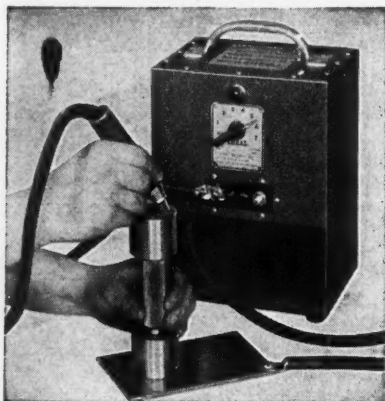


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FAMOUS FAMILY OF METAL-CUTTING TOOLS

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turned on to the proper heat. Parts can then be readily marked by means of the etching tool, which is equipped with



Ideal No. 18 "Machine Shop" Metal Etcher

special heat radiating fins and an alloy tip. A ground clamp conveniently attached to the work plate is provided for

use in etching large, heavy parts and castings. When not in use, all parts of the unit may be completely enclosed in a compact case.

"Hi-Lo" taps and a seven point switch provide 14 etching heats between 115 and 1,300 watts. A red lamp located on the front of the etcher indicates when power is on and burns brighter as each higher heat is used. The depth of mark can be further controlled by speed of writing.

The Ideal No. 18 Machine Shop Metal Etcher is designed for use with 60-cycle current, 115 volts, and has a maximum rating of 1,300 volt-amperes. The unit can also be obtained for use with other voltages and current frequencies. Net weight of etcher, 32 pounds.

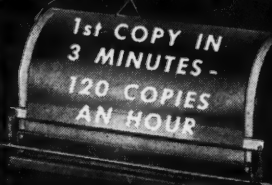
Foster General Purpose Superfinishing Machine

Ideally suited for use in performing various superfinishing operations on a wide range of miscellaneous or production work, a general purpose superfinishing machine of improved design has been brought out by the Foster Division of International Machine Tool Corp., Elmhurst, Ind. The machine, which is available

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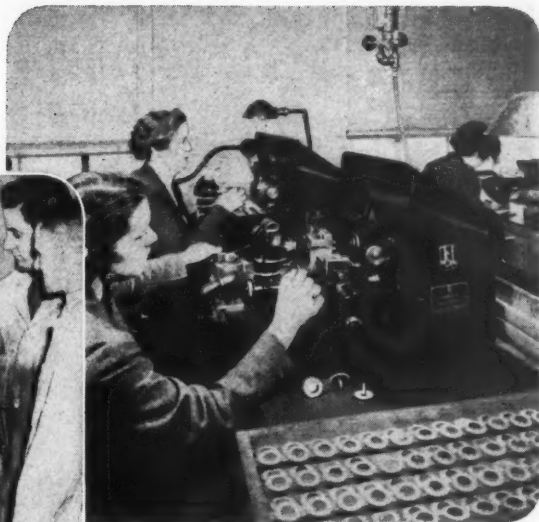
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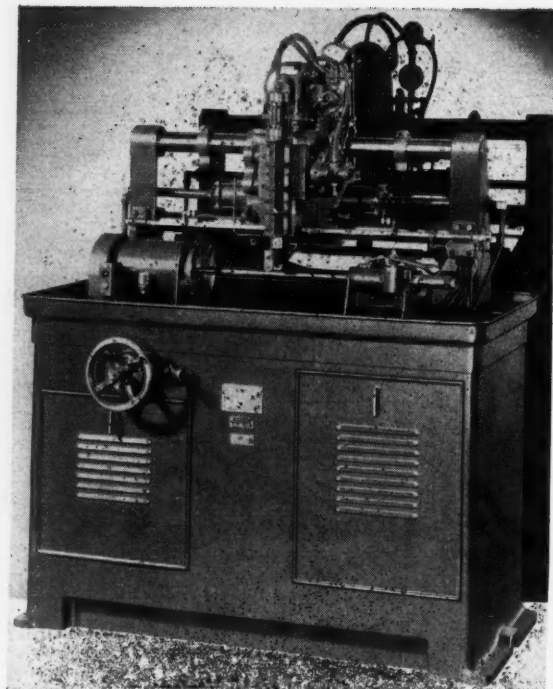


Machine Tools

JONES & LAMSON MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

Manufacturers of: Ram and Saddle Type Universal Turret Lathes - Fay Automatic Lathes - Automatic Thread Grinders - Optical Comparators - Automatic Opening Threading Dies and Chasers.



Foster 4 x 18-Inch General Purpose Superfinishing Machine

mounted spindle, which is arranged with a multi-belt drive. The spindle, which is provided with a No. 5 Morse taper, is accurately machined and equipped with large heavy threads, thus permitting the use of a face plate, three or four-jaw chuck, or special work-holding fixtures. Work-holding centers having a No. 3 Morse taper are mounted in a sleeve or adapter fitted in the spindle. Parts without centers can be accommodated by the use of a centerless roll drive.

The headstock is tongued and grooved to the table of the machine, thus ensuring perfect alignment of spindle with tailstock. Lubrication is provided by a slinger ring operating in an oil reservoir located within the headstock proper. The tailstock casting provides a rigid support for the lever-operated spring-loaded dead center, which is locked by a clamp after the work has been positioned to begin the work.

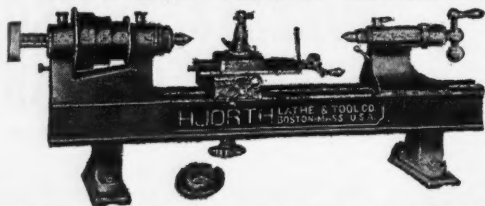
An enclosed ball bearing motor is used to drive the variable speed transmission of the machine, the transmission providing an unlimited number of spindle speeds ranging from 25 to 690 r.p.m. Speeds are controlled by a large handwheel located to the left on the front of the machine and are shown by an indicator dial and mechanism located near the hub of the handwheel.

The oscillating head carriage of the Foster Superfinishing Machine is long

able in two sizes of 4 x 18 inches and 4 x 36 inches, is said to be capable of developing an extremely accurate and fine finish of 2 to 5 micro-inches on cylindrical work, such as shafts used in aircraft engines, and so, where surface scratches and defects must be eliminated.

The bed of the machine is made of heavy cast iron and is rigidly constructed to eliminate vibration. The headstock is also made of cast iron and rigidly supports a heavy, anti-friction bearing-

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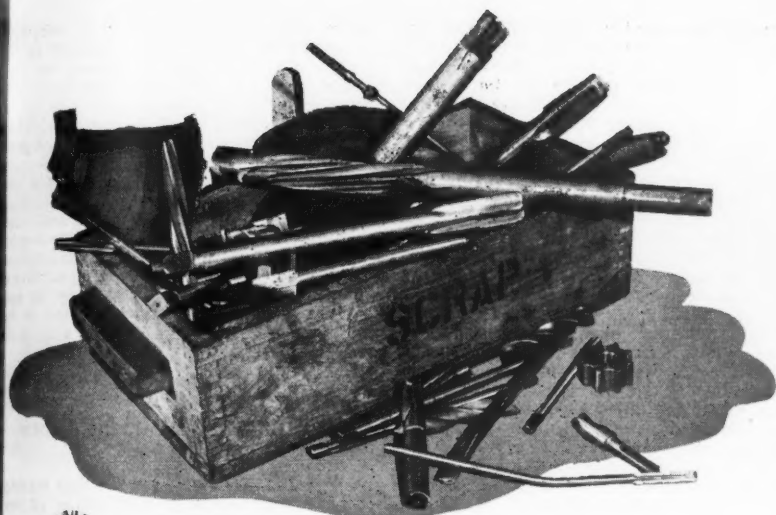
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- ★ Of high speed tool steel — that today the importance
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- ★ last ounce. Even the tungsten from filings and sludge
- ★ must be recovered and turned back into productive
- ★ channels.
- ★ The GREENFIELD TAP AND DIE CORPORATION has as-
- ★ sured our Government that a rigid plan of salvaging is
- ★ now in force in every department of its plants.
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- ★ factory and shop throughout the country. Failure to carry
- ★ out a scrupulous system of salvaging can almost be viewed
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tudinally traversed in either direction by a double-end hydraulic cylinder bolted to the back of the carriage. Traverse rate of the oscillating head may be varied from 0 to 30 inches per minute through an aperture control valve. Reverse of the head traverse is accomplished automatically through the use of a directional control valve, which is tripped by two adjustable dogs. Length of travel is controlled by the setting of these two dogs on a square rod. Two positive stops, located on the upper guide bar, are provided for fixing the location of the head when traverse is not employed.

The oscillating head, which is mounted on two rigid guide bars, is arranged with an off-center V-belt drive which provides an oscillating longitudinal traverse of approximately $\frac{1}{4}$ inch. The drive includes a self-adjusting sheave wheel which permits an unlimited number of speed changes ranging from 306 to 638 r.p.m. to be made and correspondingly unlimited variation to the rate of oscillation of the superfinishing head.

The stone-holding unit is mounted in V-type ways and may be moved toward or away from the work by an oil-operated piston, controlled by a directional valve. In addition, the stone-holding unit is arranged with a spring pressure mecha-

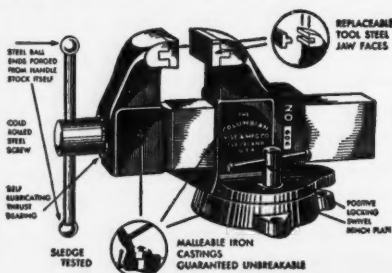
nism, the proper tension of which is maintained by the oil pressure in the hydraulic cylinder. Pressure on the stone may be varied in accordance with the requirements of the job by an oil pressure regulator. A gage is provided which the operator may check the pressure on the stone at all times.

The cutting fluid system of the machine consists of a motor-driven cooling pump complete with reservoir and filtering mechanism, all of which are located in base of the machine. Cutting fluid is supplied directly to the cutting surface of the stone, and its volume may be controlled by a small valve located in the supply line at the right-hand side of the oscillating head.

Logan No. 830 Hand Screw Machine

To meet the need for a small machine tool for continuous production of very small parts, the Logan Engineering Co., 4901 Lawrence Ave., Chicago, Ill., has developed the Logan No. 830 Hand Screw Machine shown herewith. According to the manufacturer, the machine is designed to produce parts from bar stock of

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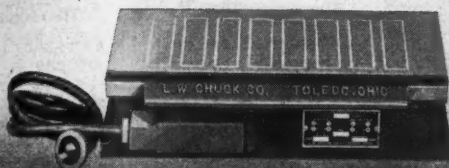
3. DON'T USE HANDLE EXTENSION



4. DON'T FORGET TO OIL THE SCREW & NUT

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Guaranteed waterproof for wet or dry grinding. Operate on either 110 or 220 volt Direct Current.

3/4" wide x 37" long	\$202.05
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2 1/2" wide x 18" long	63.15
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L-W Rectifiers

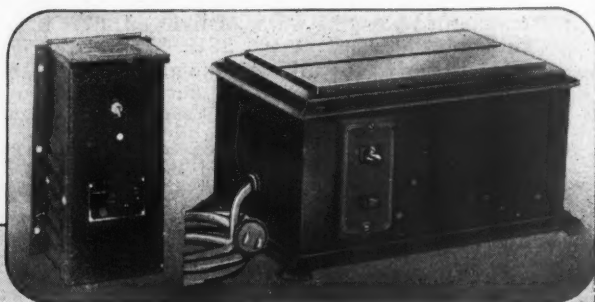
For converting A.C. into D.C. for use on magnetic chucks. Two tubes provide ample reserve tube capacity. For use on our 5 3/4" x 13" and 6 1/2" x 18" Magnetic Chucks. A.C. Input Volts . . . 110 D.C. Output Volts . . . 110. D.C. Amp. Output . . . 8 Amp. \$25.00.

L-W Demagnetizers

For removing magnetism from work that has become magnetized through induction. Simple pass over stationary poles completely demagnetizes work.

7 3/4" x 12 1/2" x 6 3/4"	\$63.20
7 1/4" x 7 1/4" x 6 3/4"	41.15

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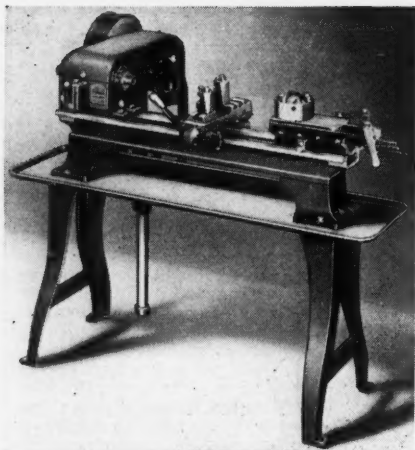


LW

CHUCK COMPANY

TOLEDO

OHIO



Logan No. 830 Hand Screw Machine

inch diameter or smaller with the same speed and precision as with larger type machines, thus releasing such machines for heavier work.

Construction features of the Logan No.

830 Hand Screw Machine include precision ground bed with two prismatic V-ways and two flat ways, precision precision ball bearing spindle mounting, and turn and cross slide provided with adjustable gibbs to compensate for wear. A speed chuck for handling round work may be fed through the spindle, and bar feed attachment are available as accessories.

Progressive Rocker Arm Welder

Designed to provide a maximum speed and operating simplicity in capacitor discharge welding of aluminum, a line of rocker arm welders has been introduced by the Progressive Welder Co., 3050 E. Outer Drive, Detroit, Mich. The welders are available with highly efficient "Revers-O-Charge" capacitor-discharge controls as well as "Frostrode" refrigerating units for low-freezing welding.

The Progressive Rocker Arm Welder has a retractable stroke of 9 to 12 inches depending on throat depth. Retraction accomplished by means of a fractional horsepower motor driving a lead screw. The welding stroke has a range up to maximum of 3 inches. The rigidly locking

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A SMALL SPLASH of the wave that will drown the Axis

PEEKING at you through the left porthole is a P&W cutter on the job. The work — an aircraft engine crankcase — stands still. The cutter makes its way around the face of a cylinder hole, slicing it down to design size with precision and dispatch.

As you'll judge from the flying coolant at the upper left, this is one of the splashiest jobs in metal working — which indicates the cutting speed and power of this P&W cutting tool.

Wherever *accurate* cutting is vital in American industry, P&W cutters, taps, dies, reamers, and end mills now are pounding out production 24 hours a day . . . hastening the time when we'll return a solid sock in the face for that slinkin' stab in the back.

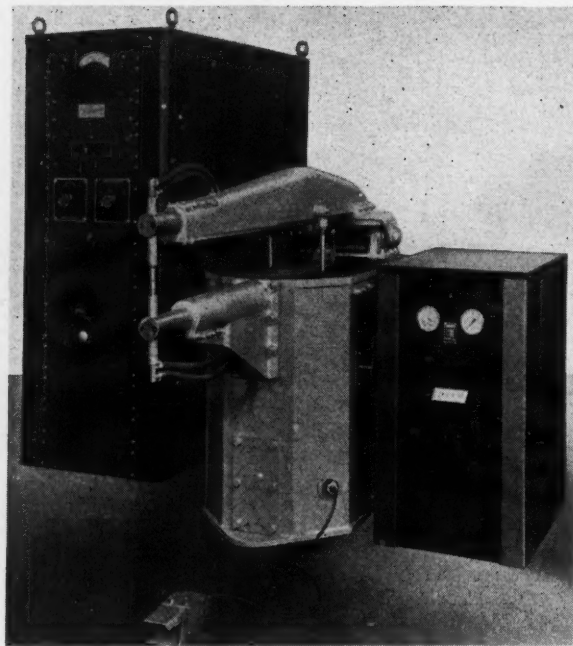
Don't spare the pressure. Your P&W tools can take it.

PRATT & WHITNEY

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WEST HARTFORD • CONNECTICUT





Progressive Rocker Arm Welder Provided with "Revers-O-Charge" Capacitor-Discharge Control (Left) and "Frostrade" Electrode Refrigerator Unit (Right)

yet slidable upper and lower arms of the unit may be adjusted in and out for throat depth or may be turned for angle mounting of electrodes when necessary.

Differential action double air cylinders are used to provide the welding stroke, the cylinder for the return stroke being smaller than that for the pressure stroke. As a result, air pressure can be maintained continuously in the return stroke

selection of any number of charging rates. Weld sequences are adjustable at the touch of a dial.

In order to ensure maximum operating efficiency and weld consistency in production, together with a minimum of point dressing, the Progressive Rocker Arm Welder is designed for use with Frostrade electrode refrigerating unit. The use of this unit is said to ensure

cylinder, thus ensuring prompt point opening after completion of weld and automatic discharge of the transformer secondary through short circuiting gas. Point dressing can be accomplished by simply exhausting the air from the return stroke cylinder by means of a three-hand valve conveniently located on the side of the machine, thus permitting the points to come together with just enough pressure to ensure point dressing.

Features claimed for the Revers-O-Charge capacitor-discharge control available with the Progressive Rocker Arm Welder include simplification of operation and freedom from service troubles due to a small number of moving parts. Voltage of the charge is controlled by a single external knob, the voltage being raised or lowered without discharging condensers. Any one of eight different charging rates is available at the turn of a tap switch, while two tap switches permit the

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FULL RANGE DRILL

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NO. 2 MACHINE WITH BACK GEAR

8" or 12" Overhang • $\frac{3}{8}$ "
Drilling Capacity in Steel •
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Footburt sensitives are built with the wide range of speeds and with the power and sturdiness to drive cutting tools to their full capacity. They are built with the care and precision that will keep them accurate over a long period.

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"I've found these STAR 'Moly'* High Speed Blades—hand or power—last just as long and cut even faster than other high speed blades they replace.

"Ten years ago, when Clemson brought out the first molybdenum alloy blade, it cost so much less that I thought it was just a 'cheap substitute'. It took the war to teach me I was wrong. Even after we've won this war, I'll be sticking to STAR 'Moly'* High Speed."

Today's STAR "Moly"* High Speed is far ahead in steel analysis and heat treatment. It's only logical that the company which developed the first molybdenum blade, and has been making them and improving them ever since, today makes the best—STAR "Moly"* High Speed, easy to recognize by its all-over metallic finish.

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Then give those new apprentices this free 20-page STAR book of hack saw knowledge. It helps speed work, save blades. Ask for **"METAL CUTTING."**

CLEMSON BROS.
INCORPORATED
MIDDLETOWN, N. Y.

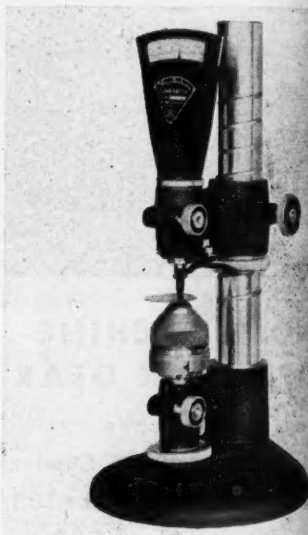
*T. M. Reg.—Blades bearing the name "Moly" are made only by Clemson Bros., Inc. and affiliated companies.



maximum of heat dissipation at points where the electrodes contact work, thus eliminating "pick-up," mushrooming of electrodes, and so on.

Ball Measuring Anvil for Scherr Comparitol

Especially designed for the rapid accurate inspection and measuring thin pieces such as crystals, laminations, shims, small gages, and so on.



Scherr Comparitol Equipped with Ball Measuring Anvil

ball measuring anvil for use on the Scherr Comparitol has been developed by the George Scherr Co., 130 Lafayette St., New York, N. Y.

In use, the work is placed between the flat feeler point of the Comparitol and the round ball surface of the anvil as shown in the illustration, accurate results being assured regardless of which part of the thin piece under inspection is being measured. All danger of the torting or bending the shim or lamination out of size a few ten-thousandths due to measuring pressure of the instrument is said to be eliminated.

In addition, through the use of the

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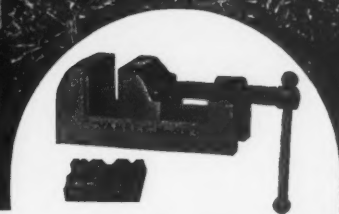
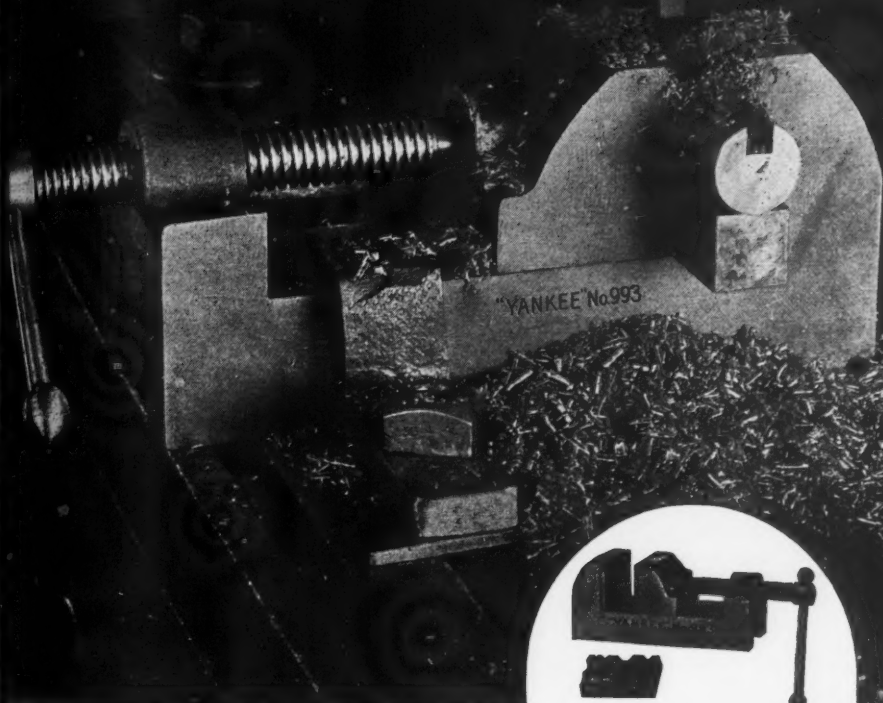
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"YANKEE" VISE

SPEEDS PRODUCTION

"Yankee" is a fast-production vise—different from any other vise in your shop! Squared all sides. Designed for continuous work—from bench to machine and back again—accurate results and no delay. "Yankee" Vise illustrated above, made in four sizes: No. 991, 1½" jaw width. No. 992,

2" jaw width. No. 993, 2¾" jaw width. No. 994, 4" jaw width. Hardened steel block, V-grooved, supplied for holding rounds.

"Yankee" Vise also available with removable swivel base. Sizes, Nos. 1991, 1992, 1993 and 1994.

ORDER FROM YOUR SUPPLY HOUSE. FOR "YANKEE" VISE CIRCULAR, WRITE NORTH BROS. MFG. CO., DEPT. M1, PHILADELPHIA, U.S.A.

ball measuring anvil the Scherr Comparitol may also be used to check the flatness or parallelism of long thin pieces in all positions and on all parts of the work. The Comparitol column, when the ball anvil is employed, is provided with an index line so that the ball point and feeler point can be lined up accurately from left to right as to center distance.

Powermatic Drive with Governor Speed Control

Designated as the Powermatic, an improved variable speed drive with governor speed control has been introduced by the Powermatic Machine Co., 659 S. Anderson St., Los Angeles, Cal. The Powermatic Drive is a simple, compact unit for transforming electrical energy into flexible, efficient power. The speed of the drive may be instantly regulated by increments of a fraction of a revolution per minute.

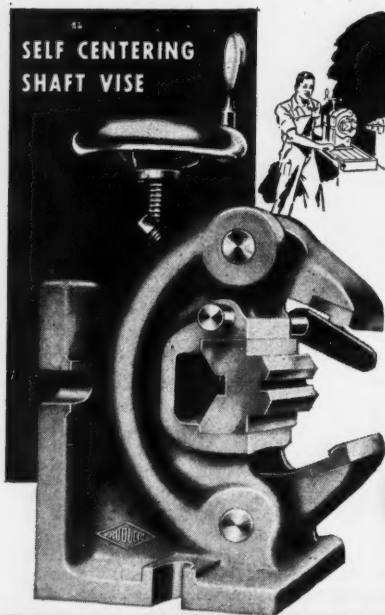
Designed to reduce operator fatigue to a minimum, the Powermatic Drive may be installed in any position or location common to standard electric motors, and is said to have all the inherent advantages



Powermatic Drive with Governor Speed Control

of a standard electric and standard V-belt drive plus accurate speed regulation, low speed high torque starting, shockless controlled acceleration, positive belt alignment, and correct belt tension at all speeds.

SELF CENTERING SHAFT VISE



a Natural... IN ANY SHOP

This modern machine vise is a "natural" because it just naturally is an asset to any machine shop. For machining slots and keyways in shafts or spindles, $\frac{3}{8}$ " to $3\frac{1}{8}$ " diameter—suitable for horizontal or vertical mounting. Setting of vise remains unaltered for all work diameters—insures accurate radial cuts. Hardened V jaw reversible in vise—equal movement of two jaws locates shafts correctly in V jaw.

Base size 8" x $7\frac{1}{4}$ ". Approx. wt. 80 lbs.

Write for circular.



The PRODUCTO MACHINE COMPANY

990 HOUSATONIC AVE., BRIDGEPORT, CONN.
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Fellows
Gear Shapers

Gridley Automatics

Thread Millers

Vertical Shapers

Lincoln Type
Milling Machines

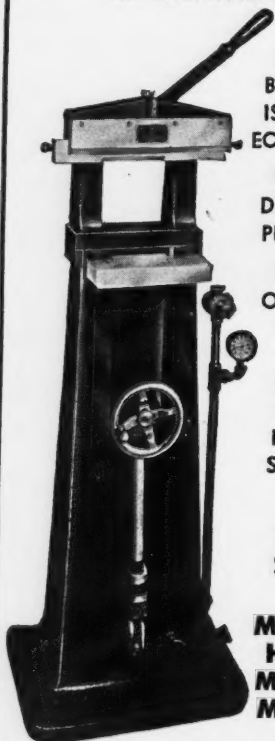
up to 30 h. p.

For Motorizing Lathes, Milling Machines, Shapers, Turret Lathes, Radial Drills, Slotters, Bolt Cutters, Gear Cutters, Die Sinks, Boring Mills, etc.

WESTERN TRANSMISSIONS

WESTERN MANUFACTURING CO. — 3400 SCOTTEN — DETROIT, MICHIGAN

YOUR PRODUCTS
ALWAYS
IDENTIFIED
IF PERMANENTLY
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IN THIS MACHINE



MARKING
BY ROLLING
IS FAST AND
ECONOMICAL.

PRESERVES
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REQUIRES
ONLY FRACTION
OF APPLIED
PRESSURE
AS COMPARED
TO STAMPING.

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**QUICK
SET-UPS**

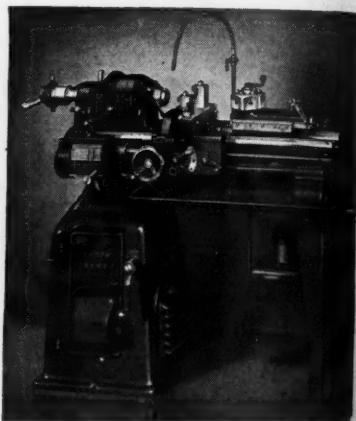
**MODEL 25
HI-DUTY
MARKING
MACHINE**

This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.
1806 BELLE PLAINE AVE.
CHICAGO, ILLINOIS

South Bend 10-Inch Turret Lathe

A 10-inch floor type turret lathe designed for the rapid production to close tolerances of small chucked work or bar stock has been announced by the South Bend Lathe Works, Dept. 42, South Bend, Ind. The lathe, which is also said to be well adapted to second operation

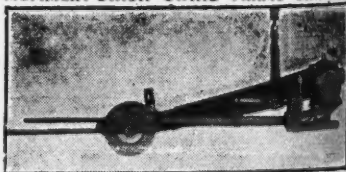


South Bend 10-Inch Turret Lathe

work, has a 10-inch swing over bed or saddle wings, 1 1/4-inch hole through headstock spindle, and 1-inch collet capacity.

The South Bend 10-Inch Turret Lathe is equipped with both a compound rest cross slide and a hand lever cross slide which are interchangeable. The latter is furnished with front and rear tool blocks which provide positions for three tools. A quick-change gearbox supplies 48 longitudinal power feeds for the universal carriage, 48 power cross feeds for the compound rest cross slide, and 48 thread-cutting feeds, 4 to 224 per inch.

MUMMERT-DIXON SWING FRAME GRINDERS



Sizes 12", 14", 16", 18", 20" and 24" wheels.

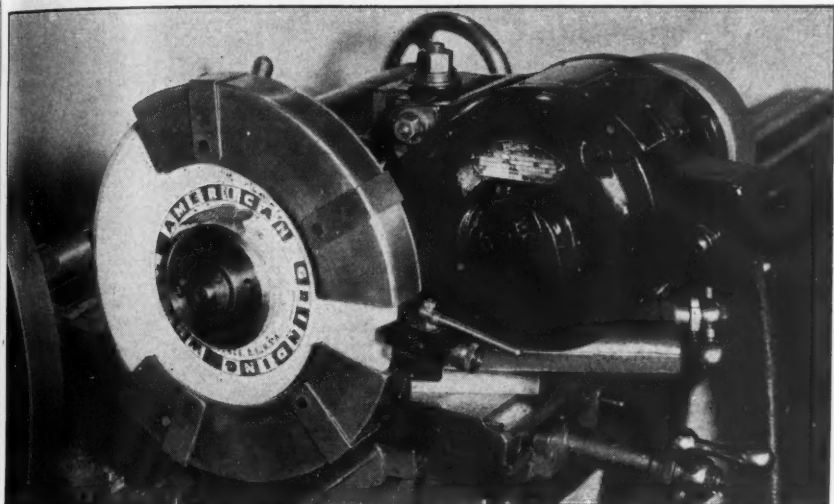
Ask for Descriptive Circular

MUMMERT-DIXON CO.
120 Philadelphia St. Hanover, Pa.

GRIND-ALL SUPER-PRECISION GRINDERS

For LATHES, SHAPERS, MILLING and BORING MACHINES

A Full Line of Portable Precision Grinders that Produce a Finish and Accuracy Not Before Attainable with a Portable Tool



Model M $\frac{1}{2}$ H.P. GRIND-ALL Super-Precision Grinder Set Up on Lathe for Thread Grinding.

Now more than ever before it is necessary to hold the greatest accuracy on all kinds of parts going into the equipment for our Armed Forces. All of the GRIND-ALL Super-Precision Grinders have the built in qualities necessary to maintain this accurate performance for month after month of constant duty.

No Grinder Manufactured By Us Has Ever Worn Out or Needed Replacement of Bearings or Other Parts, Although Some Have Run Over 15,000 Hours At High Speeds.

GRIND-ALL Grinders are being used by many leading War plants for a wide range of grinding operations from grinding external and internal threads on plug and ring gages to external grinding on heavy tank axle shafts.

If you have a grinding problem our representatives are at your service for advice on standard and special applications of our GRIND-ALL Grinders to your particular job.

4 STANDARD SIZES:

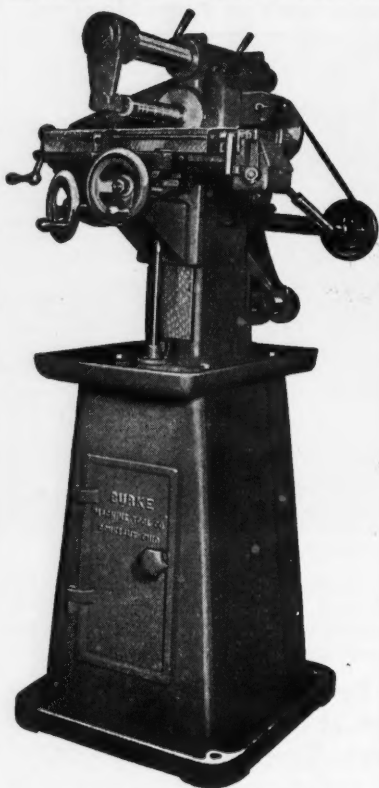
- 1/3 H.P. Motor. For wheels up to 6" dia.
- 1/2 H.P. Motor. For wheels up to 6" dia.
- 1 H.P. Motor. For wheels up to 12" dia.
- 2 H.P. Motor. For wheels up to 14" dia.

EXTRA LONG QUILLS FOR GRINDING
DEEP HOLES ARE AVAILABLE IN 8", 12"
AND 16" LENGTHS.

GENERAL MACHINE TOOL CO.

**• SENECA FALLS
NEW YORK**

BURKE MILLING MACHINES



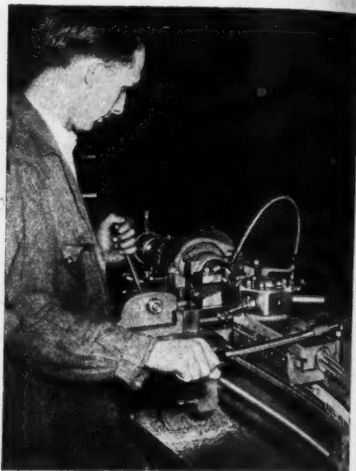
**No. 4 Motor Driven MILLING MACHINE
Mounted on Cabinet Column**

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

BURKE MACHINE TOOL CO.
297 E. 16th St. Conneaut, Ohio

The hand lever operated turret of the machine indexes automatically and has an adjustable stop for each of the six turret tool positions. Underneath motor drive and back gears provide the machine with 12 spindle speeds ranging from



**Illustration Showing Worker Operating South
Bend 10-Inch Turret Lathe**

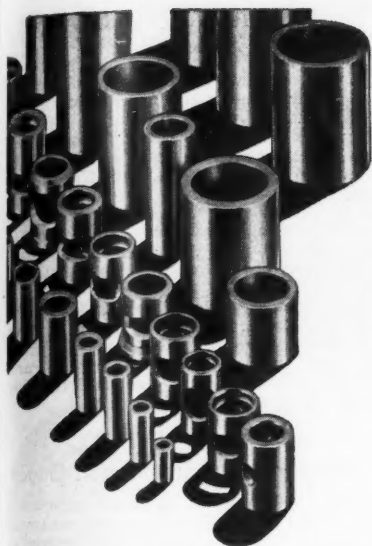
50 to 1,357 r.p.m. Lathe can be furnished with or without coolant equipment as desired.

Hobart Multi-Range Remote Control Unit

Hobart Brothers Co., Troy, Ohio, has developed a multi-range remote control unit designed to increase the quality of welds, especially those produced under modern high speed techniques. The unit, which is now a standard production feature of all Hobart welders, is fully protected from accidental breakage by a metal pull-out handle situated over the control dial and by cushion springs on the back of the porcelain rheostat. The unit is designed to provide 100 steps of fine volt-ampere adjustment and can be easily set up by using an ordinary lamp cord extension to connect it to the welding machine.

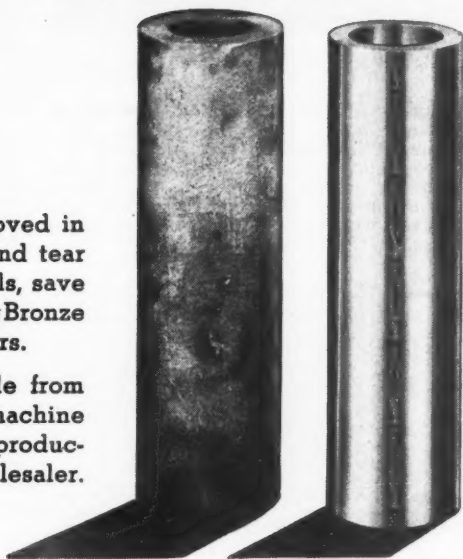
In use, the Hobart Multi-Range Remote Control Unit enables operators to weld continuously with one hand while

Saves Precious Bronze For War...



● Avoid waste of metal removed in machining operations, wear and tear on equipment and cutting tools, save labor and time by using Bunting Bronze Standardized Bearings and Bars.

Hundreds of sizes available from stock to fit applications in machine tools, electric motors and war production machinery. Ask your wholesaler. Write for catalog. The Bunting Brass & Bronze Company, Toledo, Ohio. Warehouses in All Principal Cities.



● Factory machined Bunting Bearing Bronze Tubular and Solid Bars save 25% in purchased metal and 50% set-up and machining time, in comparison with rough castings.



Bunting

BRONZE BUSHINGS • BEARINGS • PRECISION BRONZE BARS

making heat changes with the other. In other applications, the unit permits operators to change electrode sizes and



Hobart Multi-Range Remote Control Unit

adjust heat to meet weld conditions without going near the welding machine. The design of the unit also enables welding machines to be positioned near the ceiling to conserve floor space while operators below the machines use the remote control for fine current settings.

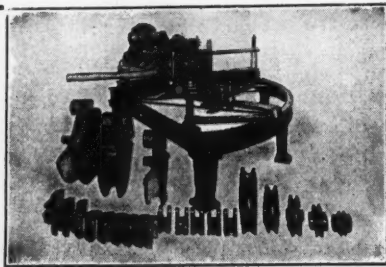
Xcel-Flux "FFG" Silver Solder Flux

A highly improved silver solder flux for use in the manufacture of cutting tools, and so on, to be known as Xcel-Flux "FFG," is now being marketed by the American Products Corp., 422 S. Dearborn St., Chicago, Ill. The flux is especially adapted for brazing and silver soldering cutting tool metals, such as Ramet, Carboly, Stellite, and so on, to tool shanks. The flux can also be used with brass, copper, alloys, and extruded nickel silver.

Xcel-Flux "FFG" Silver Solder Flux is a highly concentrated product and when properly diluted, its cleansing properties are said to be extremely active. Parts brazed with the flux are said to never break at the point of brazing.

"Micro-Chek" Inspection Gage

Designed to meet the vast number of additional inspection requirements on precision parts, a gage to be known as the "Micro-Chek" is now being manufactured by Trico Products Corp., Buffalo, N. Y. The gage employs a sim-



THE AMERICAN COLD PIPE, CONDUIT AND TUBE BENDING MACHINES

QUICK DELIVERIES . . .

HAND OPERATED TYPES in capacities of 1 in., 2 in., 3 in., 4 in. **MOTOR OPERATED** in three capacities, ½ in. to 4 in., ½ to 6 in., and ½ in. to 8 in.

Early shipments on hand operated machines; on motor powered from four to six weeks.

Wire or air mail letter for printed matter and prices.

Three New Machines: No. 1—For bending extra heavy pipe up to 3 in. No. 2—For bending all kinds of thin gauge tubing without use of mandrel. No. 3—For bending IPS conduit.

AMERICAN PIPE BENDING MACHINE CO., INC.

25 PEARL ST.

BOSTON, MASS., U. S. A.

**FOR NATIONAL
DEFENSE
We Are Ready
To Serve You**



WAGNER *can kill* WAR INDUSTRY'S NEED FOR DEPENDABLE MOTORS



Get the Facts

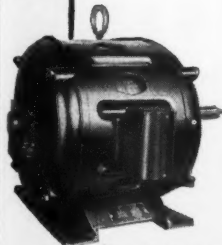
Write for your copies
of Bulletins MU-176,
MU-182 and MU-193



It takes plenty of dependable motors, operating at top efficiency, to maintain the high-speed production so necessary in our "all-out" war effort.

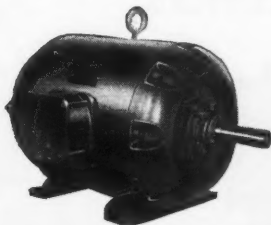
Wagner fully realizes this, and is working day and night turning out more motors now than ever before, and is supplying these reliable motors wherever they are needed to help our country on to victory.

If you need motors to carry on your war-material production, consult Wagner. Twenty-five sales and service branches, located in principal cities, are ready to help you in selecting the RIGHT Wagner motor for the job.

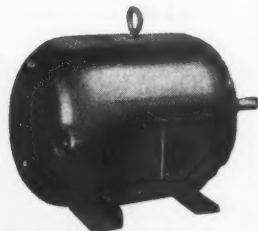


MU-22A

Type RP Squirrel-Cage motors are used on machine tools and other electrically driven equipment that operate in clean, dry locations. 1/6 to 400-hp, 25 to 60 cycles, 2- or 3-phase.



Type HP motors are ideal for machines located where inflammable materials and substances are handled or manufactured. 3/4 to 125-hp, 2- or 3-phase, 25 to 60 cycles.

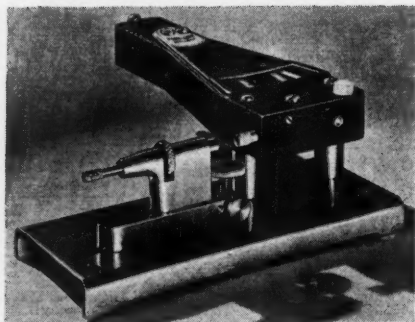


Type CP totally-enclosed fan-cooled motors are widely used on machine tools where dust, dirt, filings, chips, fumes or other destructive elements are prevalent. 1-1/2 to 125-hp, 25 to 60 cycles, 2- or 3-phase.

Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, Mo., U.S.A.

MOTORS • TRANSFORMERS • FANS • BRAKES



"Micro-Chek" Inspection Gage Mounted on Universal Base and Equipped with Adjustable Anvil

ple mechanism of levers to multiply dimensions, this multiplying mechanism being controlled by a push button.

The Micro-Chek is a comparator type of gage which is set by the use of two master parts, one having the limit of dimensional tolerance on the high side and the other having the dimensional tolerance limit on the low side. Two limiting fingers on the gage are set so

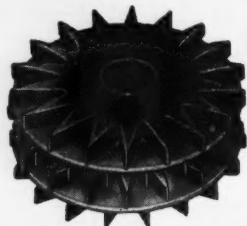
that production parts may be compared to the master parts and thereby checked for "go" and "no go" limits. The gage is supplied with universal base and with or without adjustable anvil.

Leach External Grinder

The illustration shows the Leach External Grinder for grinding parts from $\frac{1}{8}$ to 7 inches in diameter and from $\frac{1}{2}$ to 11 inches in length which has been brought out by the H. Leach Machinery Co., 387 Charles St., Providence, R. I. Construction features of the machine include a massive base and pedestal, 48 square inches of hand scraped bearing surfaces, power feed, micrometer adjusted tailstock with spring action, hardened and ground tailstock and dead center spindles, and so on.

The work spindle is mounted on two precision roller bearings and is driven by a $\frac{1}{4}$ h.p., 60 cycle, 110-220 volt, a.c. motor at speeds from 73 to 294 r.p.m. The wheel head spindle is mounted on three precision ball bearings and is driven by means of a 1 h.p., 60 cycle, 110-220 volt, a.c. motor at a speed of 2,750 r.p.m. The table of the machine is

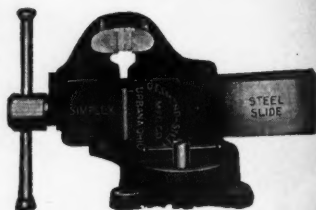
DESMOND GRINDING WHEEL DRESSERS and CUTTERS



We can supply you with the proper Dresser and Cutter for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

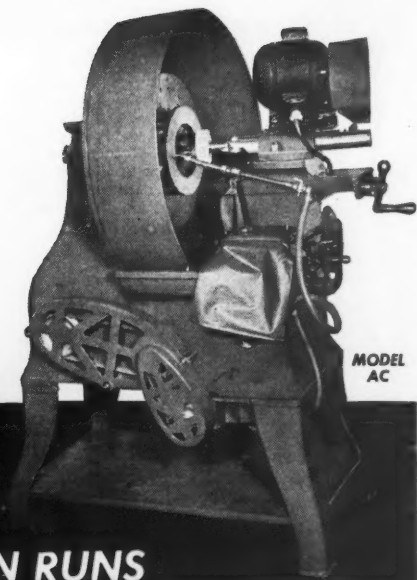
SIMPLEX Steel Slide VISES



A full line of Machinists' Filers, Welders, Production and Drill Press and Milling Machine Vises.

Let us send you our vise catalog and name of your nearest dealer.

THE DESMOND-STEPHAN MFG. CO. -:- Urbana, Ohio



MODEL
AC

GRINDERS

WITH
AUTOMATIC

SIZER FOR PRODUCTION RUNS



This simple device assures exact duplication of successive pieces. Saves time.

Even inexperienced women can grind production jobs accurately with the Lempco automatic sizing device. External, internal, face, taper, or straight finish grinding **and** rough turning! 30" swing. Quick-change 80 or 130 RPM work speeds. Hand-scraped dovetailed ways with adjustable tapered gibs for cross-slide and carriage. 7" cross-slide travel; 16" carriage travel. Heavy-duty, accurate, fast, easy to operate!

EARLY DELIVERY — BASE PRICE: \$1200

Priorities Can Be Had — Write Us.

LEMPCO
PRODUCTS · INC.
BEDFORD · OHIO · U.S.A.
ESTABLISHED 1919

SEE ONE WORK — MAIL COUPON

Lempco, Dept. MM, Bedford, Ohio

GENTLEMEN: Tell me plant nearest me where I may see a LEMPCO Grinder in operation.

NAME

ADDRESS

CITY STATE



**"This Award
symbolizes your
country's appreciation."**

... James Forester, Undersecretary of Navy

Winning of the coveted Army-Navy "E" Award by the Clayton organization has inspired every employee to even greater effort... and serves as a constant reminder of the great production job ahead of all America.

**Speed Your
PRODUCTION--**

**SAVE TOOL
ROOM TIME!**



with

**CLAYTON BORING
BARS and HOLDERS**

Clayton Boring Bar Holders add extra production hours to every shift by: 1) permitting changes or adjustments of bars without disturbing alignment with lathe, 2) maintaining settings when removed from lathe, 3) providing greater rigidity, 4) eliminating "fingering."

Clayton Boring Bars save tool room time and permit heavier cuts without chatter. Permanently calibrated quarter inch graduations... minimum surface tension... bit holes accurately broached—eliminate vibration, save time.

Speed your war production with Clayton Bars and Holders. Write for complete descriptive matter and prices.

CLAYTON

MANUFACTURING CO.

ALHAMBRA
CALIF.

provided with six feeds of $\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, $2\frac{1}{2}$, and $3\frac{3}{8}$ inches per minute.

Standard equipment of the Leach External Grinder includes an emery wheel, diamond wheel dresser, belts, and wrenches. The machine occupies a work



Leach External Grinder

ing space of 51 x 32 inches, has a net weight of 750 lb. and shipping weight of 850 pounds.

Koehler Turret Heads

The Koehler Model A Turret Head shown herewith is one of two models of turret heads now being distributed by the Master Machine Co., 19 Grove St. Stamford, Conn. This head is a six-tool type, employing standard $\frac{1}{8}$ -inch tool bits, and can be used on most engine lathes with swing from 9 to 12 inches where the distance between top of compound rest and center line of lathe is from 1 to $1\frac{1}{2}$ inches. The head can be easily installed by simply removing the tool post of the lathe and placing head in position.

The other model turret head available—Model B—is an eight-tool type, employ-

TYPICAL

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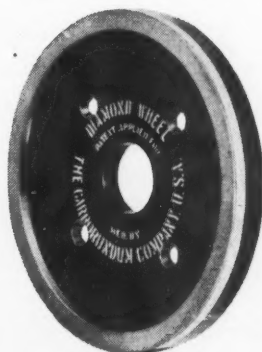


THE C
Sales Offices at

How you can save on Diamond Wheels!

TYPICAL COMPARATIVE DIAMOND WHEEL COSTS

	Depth Diamond Section	Cost per Wheel	Number Wheels Required for Equal Service	Total Cost for Same Amount of Grinding Service	Saving Resulting from Using Thicker Section
TYPE DOW CUP WHEEL					
Diamond in Rim					
6" x 1/4" - 3/8" Rim	1/32"	\$63.55	4	\$254.20	
100 Concentration	1/8"	184.65	1	184.65	\$69.55
Same Wheel	1/16"	63.55	2	127.10	
50 Concentration	1/8"	103.90	1	103.90	23.20
TYPE DIT STRAIGHT WHEEL					
Diamond in Periphery					
6" x 1/8"	1/32"	30.05	4	120.20	
100 Concentration	1/4"	73.80	1	73.80	46.40



• The thickness of the diamond, or grinding, section of standard diamond wheels varies from $\frac{1}{32}$ to $\frac{1}{4}$ inch. Actually it is better economy to use the thicker sections wherever possible. A $\frac{1}{8}$ inch section, for instance, contains four times as many carats of diamonds as the thinnest section, and does four times the work. But the cost of one $\frac{1}{8}$ inch section is far less than its equivalent of four $\frac{1}{32}$ inch sections.

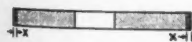
Why? Because in the first instance you pay for only *one* basic wheel shape, or "preform" and in the second you pay for four! Thus you save money by specifying the thicker diamond sections. The table above shows actual savings in a few typical cases.

By buying wheels with thicker diamond sections you save more than your *own* money. You also help conserve essential war materials and labor.

We urge you to take advantage of this saving, and thus also cooperate with us in conserving time and materials vital to our mutual war effort.

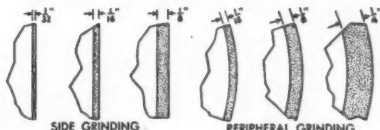


Construction of a Diamond Wheel for Side Grinding



Construction of a Diamond Wheel for Peripheral Grinding

X Dimension Shows Thickness of Diamond Section



SIDE GRINDING

PERIPHERAL GRINDING

CARBORUNDUM

ABRASIVE PRODUCTS

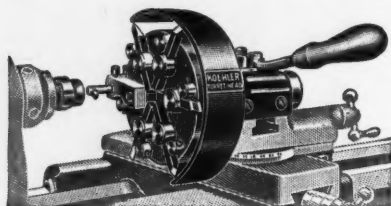
THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

REG. U. S. PAT. OFF.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids
(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

ing standard $\frac{3}{8}$ -inch tool bits, and is designed to fit lathes with 12-inch swing or more where the distance between top of compound rest and center line of lathe is $1\frac{1}{2}$ inches or over. This head is similar in design to the six-tool head but is of larger and heavier construction throughout.

Both model turret heads are constructed so that each tool bit can be independently adjusted for height, thus allowing for sharpening and wear of tools. Approximate weight of Model A head, 12

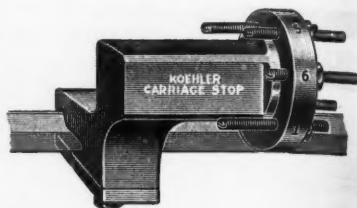


Koehler Model A Turret Head

lb.; approximate weight of Model B head, 25 pounds.

A six and eight-position carriage stop for use with the Model A and Model B

turret heads respectively is also being distributed by the company. These units provide an adjustable stop for each tool



Koehler Six-Position Carriage Stop

of the turret heads and are said to be especially useful in performing duplicate boring and shoulder working operations. To use, the carriage stops are simply clamped on the V-way of the lathe near the headstock and adjusted accordingly.

Federal Taperlock Gage Handles

Due to the existing metal shortage, Federal Tool Corp., 412 N. Leavitt St., Chicago, Ill., has introduced a line of

Butterfield Taps

The Defense Program requires small tools that are accurate and long lived.

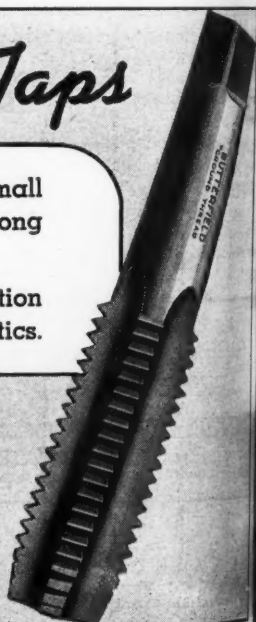
Butterfield Taps have a reputation for both of these characteristics.

UNION TWIST DRILL CO. BUTTERFIELD DIVISION

Factories: DERBY LINE, VERMONT, U. S. A.
Athol, Mass.; Mansfield, Mass.;
Rock Island, Quebec, Can.

Stores:

CLEVELAND	3346 SUPERIOR AVE.
CHICAGO	77 S. CLINTON ST.
DETROIT	6540 ANTOINE ST.
NEW YORK	61 READE ST.





There is only one Perfect Cutting Oil for your particular job!

A cutting oil problem can turn into a bottleneck that slows production, delays schedules, squanders time. This is especially true today—for wartime specifications are rigid and exacting . . . and priorities have introduced many new and unfamiliar materials.

The problem is *to find the one perfect cutting oil for your particular operation—a cutting oil that will assure more production, better finish, faster turnover.*

Why not get the benefit of our experience? We'll be glad to have a Cities Service lubrication engineer consult with you on the problems of your particular job. This service is yours for the asking. Just phone or write our office nearest you, today!

An informative booklet, "Metal Cutting Lubrication," is available to cutting oil users. Simply fill out and mail the coupon below.

OIL IS AMMUNITION — USE IT WISELY!



Write to —
CITIES SERVICE OIL COMPANY
Room 1326, Sixty Wall Tower, N. Y.
or any of the following offices:
CHICAGO . CLEVELAND . ST. PAUL
KANSAS CITY . BOSTON . TORONTO
or to
ARKANSAS FUEL OIL COMPANY
SHREVEPORT. ATLANTA. BIRMINGHAM

FREE! Just Clip and Mail

Please send me your booklet,
"Metal Cutting Lubrication."

Name

Firm Name

Address

City State N.H.

A LUBRICANT FOR EVERY INDUSTRIAL NEED



Federal Taperlock Gage Handle

plastic gage handles of a type illustrated herewith. The handles, which are known as Federal Taperlock Gage Handles, are accurately made to standard dimensions accepted throughout industry and are constructed of an unusually light plastic material, thus reducing operator fatigue due to continuous use to a minimum. The handles can be marked with the same lettering stamps used for marking metal handles.

Trojan "Quik-Sil" Oil Absorbent Compound

A highly efficient oil absorbent compound for use on cement, wood, and steel floors, to be known as "Quik-Sil," is announced by Trojan Products & Mfg. Co., 3130 S. Wabash Ave., Chicago, Ill.

The material is said to soak up oil and grease on the surface which it is applied and to leave floors bone-dry. In addition, the compound is said to quickly dry kerosene, gasoline, and various solvents on floors.

According to the manufacturer, Trojan Quik-Sil Oil Absorbent Compound is harmless to skin, odorless, and dustless, and will not be when oil soaked. The compound is said to be excellent for use around machinery which drip or splash oil, on sidewalks and so on.

Willey's Double-End Tool Grinder

Designed to provide utmost efficiency in the freehand grinding of tungsten carbide-tipped tools as well as other types of tool bits, the Willey's Double-End Tool Grinder shown herewith has been brought out by the Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit, Mich. The unit is furnished complete with coolant pump and pan for grinding.

The motor is of special design and available for operation on 220 or 440 volt.

To Expedite

PRODUCTION . ASSEMBLY
INSPECTION

HALL O W E L L

SHOP EQUIPMENT

Is Just What You Need

Choose from 1367 "HALLOWELL" Work-Bench Combinations. Strong and rigid without costly bolting to floor with tops of laminated wood, Masonite or, if advantageous, of steel. Legs—in five different heights and widths for your selection. Deliveries are better than average. Write for complete details—today.



STANDARD PRESSED STEEL CO.

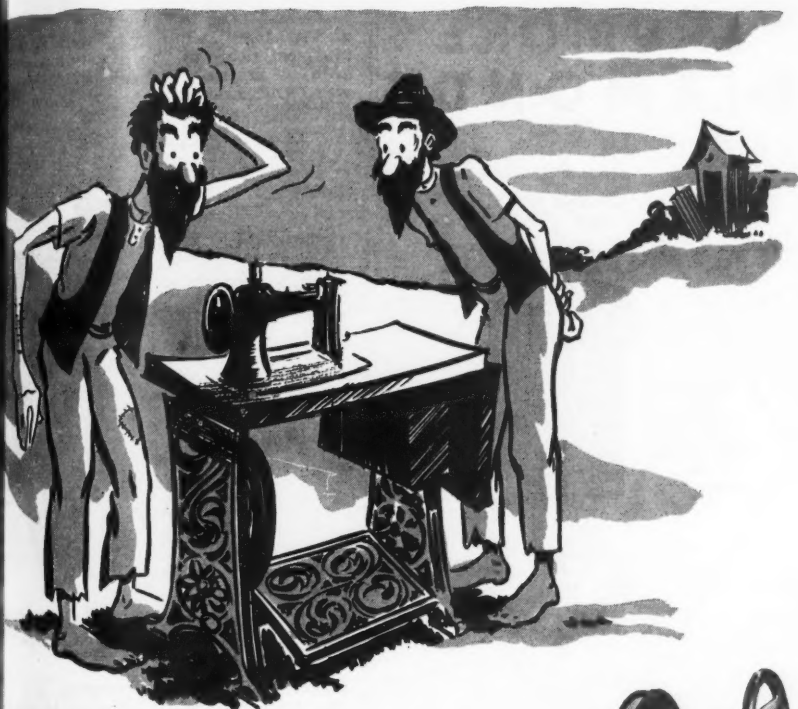
JENKINTOWN, PENNA. BOX 556

— BRANCHES —

BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

Fig. 10
"Hallowell"
Work-Bench
Laminated wood
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, Detm
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for v
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440 vol



**"...Wonder when Ma will want a
Vari-speed Dingus on *this* machine?"**

IT'S TRUE! Most old machine tools can be modernized to operate at 30% higher spindle speeds...to change speeds easier, without gear or belt shifting, to give an overall lift in production of from 50 to 100% with the Given Vari-Speed Drive! Time is saved, fatigue lowered... the right speed is always available for the job whether turning or facing, milling, shaping or boring.

Do you need more R.P.M., more **CONVENIENCE**, more **OUTPUT** from your present equipment? Then get our recommendations for Given Vari-Speed Drive installations.

Given VARI-SPEED DRIVE
GIVEN MACHINERY CO., 3855 SANTA FE AVE, LOS ANGELES

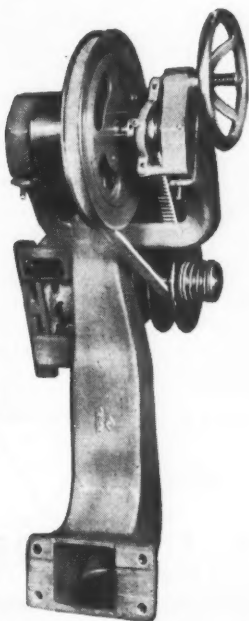


Fig. 10
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"TRUMORE" DIAMONDS

**NORTON
HEX**



Diamond
held
securely
in special
nickel alloy.
Any
mounting.

Never
wears
dull.
Requires
no
resetting.



Complete tool: $\frac{1}{2}$ carat, \$3.50—
 $\frac{1}{2}$ carat, \$7.50—1 carat, \$22.00.
All sizes up to 5 carats in stock.

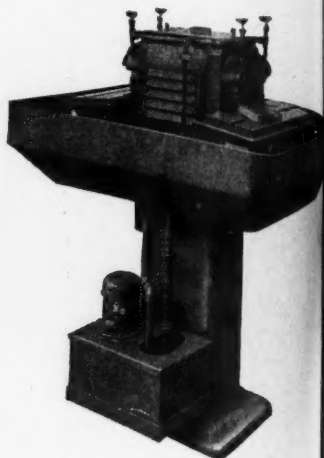


**IMMEDIATE
SHIPMENT.**

**WRITE
TODAY.**

F. F. GILMORE & CO.
112 DARTMOUTH ST. BOSTON, MASS.
DIAMOND IMPORTERS AND TOOL MAKERS

60 cycle, three phase current at a speed of 3,450 r.p.m. The accurately machined tool rest table of the machine is adjustable to all angles between 30 degrees forward and away from the wheel for



Willey's Double-End Tool Grinder

ing tools with various angles. The machine can also be readily adjusted to compensate for wheel wear.

Skilsaw Models AD and AE Portable Electric Grinders

A 4 and 5-inch grinder designated the Model AD and AE respectively have been added to the line of portable electric tools manufactured by Skilsaw Inc., 5037 Elston Ave., Chicago. According to the manufacturer, these grinders are especially engineered to meet today's high speed requirements for performing all grinding, wire brushing, polishing, and buffing operations.

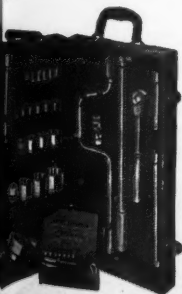
Both grinders are said to incorporate every feature of advanced design, sturdy construction essential to maximum performance and adaptability to a wide variety of applications. Ball bearings mounted in steel inserts on the front and extreme ends of the wheel shafts absorb thrust, eliminate vibration, and ensure cool operation. Commutator and switch are fully enclosed for protection against dust, and strapping

seconds saved here ... Can mean days saved here



Get Faster Production

With Snap-on Tools



Thousands of times on each production run these milling machine fixture nuts are loosened and retightened. Saving only one second per nut through use of Snap-on speed tools means hours saved on every job!

Check the wrenches your operators use and replace old, clumsy tools that "came with the machine," with Snap-on Speed Wrenches. Your men will appreciate the safe convenience good wrenches give them and your production will gain by the speed with which machine adjustments and fixture lock-ups are made.

Snap-ons are available for either hand or power operations through 35 factory branches. For catalogs "T" (Hand Tools) and "42-PT" (Power Wrenches) write . . .

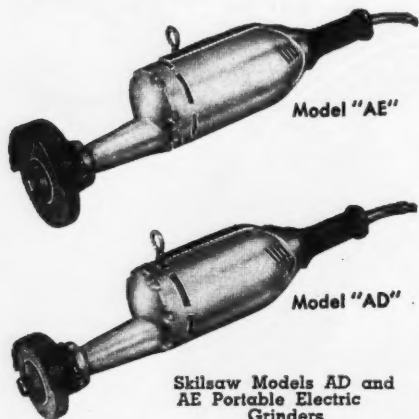
Snap-on Tools
THE ENGINE OF BETTER MECHANICS

SNAP-ON TOOLS CORPORATION

8032-K 28th Avenue

Kenosha, Wis.

line ventilation blows dirt away from operator and prevents clogging. Fine steel gears, heat treated for long life



Skillsaw Models AD and AE Portable Electric Grinders

and spline-mounted on shafts, are provided for quiet and powerful operation. Universal motor assures full efficiency under load, and rubber sleeve handle

provides operator with firm, cool, non-slip grip.

The Skillsaw Model AD Portable Electric Grinder is 22 inches long and weighs 15 lb. The unit is designed for use with a grinding wheel 4 x 3/4 x 1/2 inch in size and operates at a no-load speed of 4,500 r.p.m. The Model AE grinder is 22 1/2 inches long and weighs 18 lb. This unit is designed for use with a grinding wheel 5 x 3/4 x 1/2 inch in size and operates at 4,200 revolutions per minute.

Jabsco Self-Priming Coolant Pump

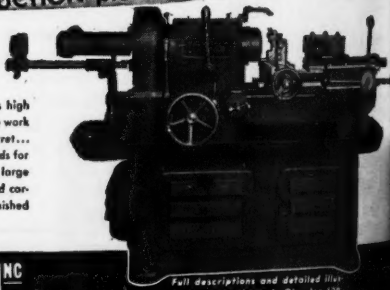
Illustrated herewith is a self-priming coolant pump designed for use with either thick or thin coolants which have been placed on the market by the Jabsco Pump Co., 8302 Wilshire Blvd., Beverly Hills, Cal. The pump is extremely simple in construction and operation, having only one moving part—a Neoprene synthetic rubber impeller which fits snugly inside the pump housing and creates a near vacuum, thus eliminating any need for priming. In addition, the design of the impeller is such a certain amount of solids may pass through

The MOREY 2G
Back-Geared
TURRET LATHE
Timken Bearing
Self-Locking Turret—Infinite Spindle Speeds

CAPACITY
Automatic Chuck (round) 1"
Swing over cross slide 6"
Swing over bed 14"

Features HIGH SPEED PRODUCTION plus OPERATING ECONOMY

The MOREY 2G Timken Bearing Turret Lathe insures today's high speed production with a minimum of operating expense. More work at less cost with these money saving features: Self-Locking Turret... Vibrationless precision with an infinite variety of spindle speeds for every job... Back Gears instantly thrown in through extra large Twin Disc Clutch... takes full advantage of high speed and carbide tools. Modern design for modern production. Can be furnished with tooling.



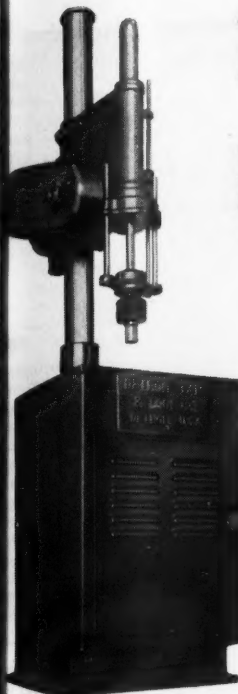
MOREY MACHINERY CO., INC.
418 BROOME STREET • NEW YORK, N. Y.

Full descriptions and detailed illustrations are shown in Circular 629 Ask for IT TODAY!

With su...
• Spindle
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• Lead-Sc...
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• Autom...
turn str...
• No end

and now....

A LINE OF SPECIAL "DETROIT" HIGH PRECISION TAPPING MACHINES



At Left—

Series LTM Light
Duty High Precision
Tapping
Machine



At Right—

Series HTM
Heavy Duty Precision
Tapping
Machine

Intermediate
Sizes also
available.

With such features as:

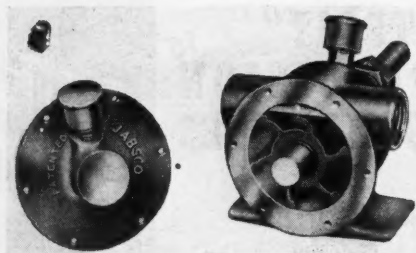
- Spindle nose guided during entire stroke
- Lead-Screw driven at bottom, eliminating inaccuracies due to "wind-up"
- Available with single or multiple tap heads
- Automatic reverse and return stroke
- No end play in tap spindle

For complete details write for Bulletin No. TM-43



8432 BUTLER
DETROIT

pump without clogging or injuring it. Designed for long life, the Jabasco Self-Priming Coolant Pump is said to be par-



Jabasco Self-Priming Coolant Pump

ticularly adaptable for use where pressure requirements are low, and can be easily and quickly installed on milling machines, lathes, tapping machines, and other machine tools. The pump may be mounted at any angle for operation in either direction and is available in $\frac{3}{4}$ to $\frac{5}{8}$ -inch sizes with capacities from $2\frac{1}{2}$ to 22 gallons per minute. All parts of the unit except the impeller are of bronze.

Dow-Northrop Magnesium Welding Method

A large amount of strategic magnesium metal which has been already fabricated but rejected because of defects can now be quickly and restored to usefulness by means of the fusion method of welding developed by The Dow Chemical Company and Northrop Aircraft, Inc. The method, which makes use of the peculiar properties of helium—an inert, nonexplosive, nonflammable gas—is said to be particularly useful for reclaiming vital aircraft castings discarded because they did not meet standard specifications.

Advantages provided by this method of joining metal include elimination of defects, ease of operation, and great range of production over a wide range of design. These advantages, it is claimed, are made possible because of the fact that the electric arc applied to the magnesium metal is shielded by a blanket of helium gas which prevents oxidation of the molten weld metal. Complete information on the Dow-Northrop Magnesium Welding Method can be obtained by writing to The Dow Chemical Co., 919 Jackson Ave., Midland, Michigan.



C-F POSITIONERS

are universal tools

... for handling holding work.

Capable of tilting, turning, holding giant weldments so that every angle can be made down hand. Positioners also save time, and lower the cost of positioning and holding work for chipping, snagging, grinding, flame cleaning and machining operations like angular drilling, etc. C-F Positioners are found not only in the welding shops but in machine shops, die shops, production lines as well. Capacities from 1,200 lbs. (hand operated) to 30,000 lbs. Each a universal tool, pedestal mount adjustable for height, with base that turns completely around and tilts at any angle to horizontal.



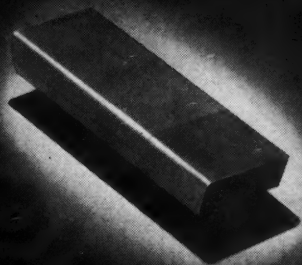
Write for Bulletin WP 22

CULLEN-FRIESTEDT CO.

1311 N. KILBOURN AVE.

CHICAGO, ILL.

Conserving High Speed Steel.....



... it's an old story at Genesee

Long before limitations were placed on the use of High Speed Steel (18-4-1), the makers of "Tomahawk" tools were already regularly producing cutting tools made up of H.S.S. tips on soft steel shanks.

Such "Tomahawk" tools were being used in regular production by one of the largest automobile manufacturers, for instance, as far back as 1938.

Production quantities were not large

—in those days there was no tungsten shortage—but it did provide Genesee with the essential production background to produce such tools when suddenly needed in quantities.

That has been and will continue to be one of Genesee's policies:— to be ready with new forms of "Tomahawk" quality tools, standard or special, for any set of conditions, — for war or for the peace to follow.

We will be glad to send you a condensed catalog of "Tomahawk" tools, streamlined to present conditions. Ask for Catalog No. GT-42-MMS

GENESEE TOOL COMPANY
FENTON, MICHIGAN





**FAST—PRACTICAL
MORE POWERFUL!**

Madison-Kipp tool makers originated the first really high speed grinder. They know a great deal about the practical side of grinder design and grinder usage. They think the new Model H is the best all around off-hand tool they have ever tried and we are sure you will agree with them. It's fast (50,000 R.P.M.), more powerful, and has a handier grip. **ORDER TODAY!**



\$29⁷⁵

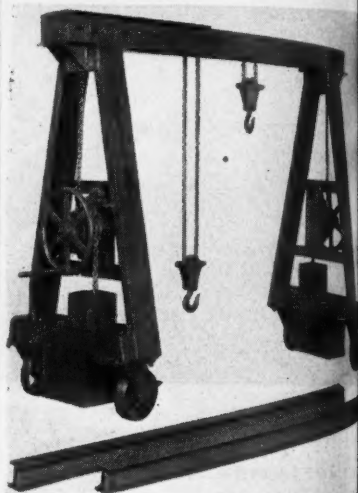
Please Indicate
Preference Rating
On Order.

MADISON-KIPP CORP.
208 WAUBESA STREET
MADISON, WISCONSIN



Service No. 417 Adjustable Gantry Crane

Designed for lifting and transporting delicate machinery around plants, the Service No. 417 Adjustable Gantry Crane illustrated herewith has been introduced by the Service Caster & Truck Co., 40 Somerville Ave., Somerville, Mass. The unit can be adjusted for length for use in close quarters and is constructed in



Service No. 417 Adjustable Gantry Crane

a manner as to straddle the machine to be lifted. After a machine is raised, the beams are placed underneath it so that the crane carries the load without hanging from the hooks.

The Service No. 417 Crane has a capacity of 6,000 lb., each hook being designed to lift a total of 3,000 lb. a distance of 5 feet 6 inches. The crane has an overall height of 7 inches and overall length of frame of 8 inches, and is equipped with 10-inch diameter swivel casters having brakes and swivel locks. The distance between members of the unit is adjustable from 4 feet 6 inches to 6 feet by steps of 3 inches.

Leiman Portable Sandblast Outfit

Designed for use in sandblasting practically any size and shape of material

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BRONZE OILITE
(Plain Bearing)

SUPER-OILITE
(Thrust Bearing)

IRON OILITE
(Pump Bearing)

WHITE BRONZE
(Instrument Part)

SUPER-OILITE
(Machine Part)

WHITE OILITE
(Machine Part)

DAMASCITE STEEL
(Tensile Bar)

BRASS OILITE
(Apparatus Part)

STRESSITE IRON
(Machine Part)

METAL-POWDER PARTS

POROUS (OILITE) OIL CUSHION
BEARINGS
AND
SOLID

FERROUS (IRON) AND NON-FERROUS (BRONZE) PARTS

THEY SAVE

STRATEGIC MATERIAL—MACHINERY
LABOR, TIME AND COST

Metal-Powder Products
for War Production

The Amplex Division of Chrysler Corporation, which has for many years been manufacturing Oilite self-lubricating bearings, is now also in production on solid bronze and iron parts made from powdered metals.

Two Chrysler products are Stressite and Damascite, which can be used instead of castings, stampings, forgings or bar stock.

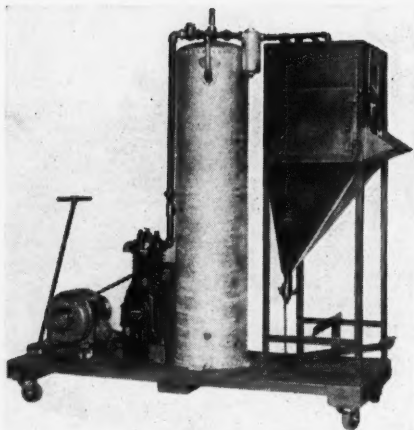
Since these parts can be made in many forms, machining is almost entirely eliminated with resultant savings in cost of manufacturing and scrap.

For example, on the instrument part made of Stressite bronze (illustrated above), two hours of machining alone used to be necessary. When the part was made from powdered metal, only twenty seconds were required to manufacture the product.

Our engineers are at your service.

CHRYSLER CORPORATION

DETROIT • (AMPLEX DIVISION) • MICHIGAN



Leiman Portable Sandblast Outfit

including metal, glass, plastic, wood, and so on, the Leiman Portable Sandblast Outfit shown in the illustration is now being offered by Leiman Bros. Inc., EW-134 Christie St., Newark, N. J. The outfit is of a self-feeding type in which a

small quantity of sand, flint, Carborundum, angular steel grit, and practically any other abrasive may be placed in a hopper, used over and over again, and is mounted on wheels, thus enabling it to be moved from one department to another as required.

The Leiman Portable Sandblast Outfit is available with arrangement for doing work by hand while performing sandblasting operations or for feeding material into the machine for automatic production at any speed desired. The outfit can be made in a number of sizes to meet various production requirements.

Lyon Hydraulic Die Handling and Stacking Truck

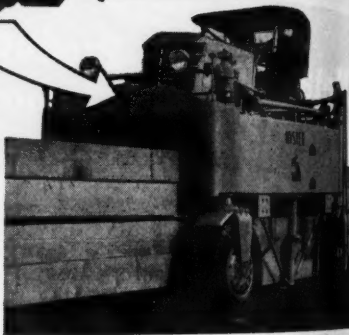
The illustration shows a hydraulic die handling and stack truck which is now being offered by the Lyon-Raymond Corp., 1069 Madison St., Greene, N. J. The truck, which has a capacity of 10,000 lb., is a cantilever type and is furnished with removable die handling boom and removable platform. The boom can be attached either to carriages or to the chassis of truck. The platform is 36 inches wide x 30 inches long, has a

Pullmore Clutches

Selected for Hoist-Control In Yardmaster Straddle Trucks

Because "they were recommended by satisfied users"; Pullmore Multiple-Disc Clutches control hoisting gear in Yardmaster Straddle Trucks built by Willamette Hyster Company. In this service; loads are heavy, run up to 3200 r.p.m., Pullmore operation may occur 500 times per 8-hour shift.

Pullmore features particularly useful in Yardmaster Straddle Trucks are: instantaneous operating response; free, cool running; durability in severe service; simplicity of adjustment. These, and other advantages, make Pullmore Multiple-Disc Clutches highly successful in machine tools, wood-working equipment, street sweepers, fire fighting apparatus, packaging, and many other automatic or semi-automatic devices. Investigate. Write, today, for the Pullmore Blue Book. Ask also about Rockford Plate Clutches. Pullmore Clutches are sold by Morse Chain Co. offices in principal cities.



Pullmore Multiple-Disc Clutches are made in single and double types; for operation in oil or dry; in capacities from 1 h.p. to 75 h.p., at 3000 r.p.m. Write, today, for complete data.

ROCKFORD DRILLING MACHINE DIVISION Borg-Warner Corporation

▼ 300 CATHERINE STREET, ROCKFORD, ILLINOIS, U. S. A. ▼

Over-Center Clutches • Spring-Loaded Clutches • Pullmore Clutches • Power Take-Off

DIAMONDS for Victory



WING-KEY
C-KEY-SET
SET-ABLE

Cooler dressing
Closer tolerances
Micrometer Accuracy
Because: Wing key
heat dissipation
and absolute dia-
mond lock nib.

Three grades of diamonds. Common quality \$12 per
carat. Medium quality \$24 per karat. Select quality \$48
per karat. (Contour template diamonds supplied only
Medium and Select quality.)

All diamond sizes $\frac{1}{4}$ to 10 karat are nib mounted for
immediate shipment... Billed subject to approval. Spe-
cial quality of diamond wanted. We recommend a
minimum size of one karat for each 6" diameter of grind-
wheel. (24 hour resetting service, \$1.00 post paid.)

and specifications and prints for prices
on turning and boring form tools.

DIAMOND TOOL COMPANY, Not Inc.
Sheldon M. Booth, Pres.
724 E. 41st Street CHICAGO, ILL.

PROMPT DELIVERY— PRECISION GROUND THREAD PLUG & RING GAUGES

American Nat'l Coarse Threads
American Nat'l Fine Threads
American Nat'l Special Threads
In Accordance to A.G.D.
Single End—Double End Plugs
—Combination of a thread
plug and plain core plug for
minor diameters.
Split Adjustable or Solid
Ring Gauges.

(Catalogues Not Available)

Sizes of
plugs up to
10" dia.

Sizes of
rings
from $\frac{1}{8}$ "
to 8" I.D.



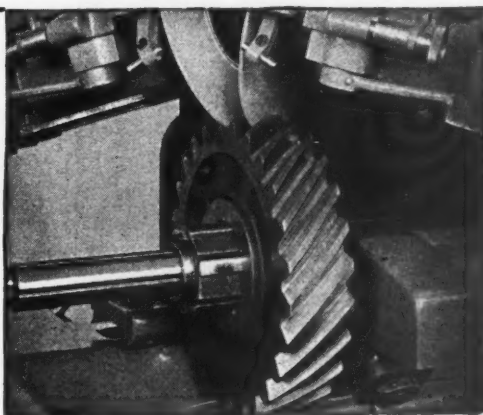
ALLEN GAUGE & TOOL COMPANY

421 N. Braddock Ave. (21). Dept. C, Pittsburgh, Pa.

High Precision Spur and Helical GEARS

Interchangeable—Quiet

We machine your blanks or cut from
bar stock. We cut and grind gears
on Moog Machines in our Jersey City
Plant to an Accuracy of Profile up to
.00012"; of Pitch up to .00024" and
concentricity of Pitch Circle, within
.0060". Gears cut to usual stand-
ards without grinding. (We do not
make worm or bevel gears.)




Or Gears cut to usual standards
without grinding.

SWISS-AMERICAN GEAR MFG. CO.

5001 CHRYSLER BLDG.

NEW YORK, N. Y.



S.A.E. - A.I.S.I. - N.E.

*Alloy Steels
for
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SCIENTIFICALLY
SELECTED
TO CONSERVE
CRITICAL ALLOYS.

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Immediate
Shipment
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Seven
Warehouses.

WHELOCK, LOVEJOY & CO., INC.
130 SIDNEY ST. • CAMBRIDGE, MASS.

BUFFALO	NEWARK
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	DETROIT

ered height of 8 inches and eleva
height of 62 inches.

The truck, which weighs 1,075 lb.,
an overall height of 94 inches and



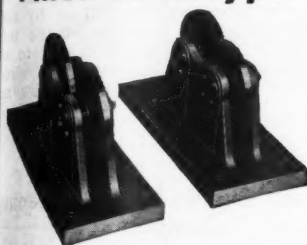
Lyon Hydraulic Die Handling and Stacking
Truck

provided with fifth wheel steer. All
wheels are 8 inches in diameter and are
equipped with roller bearings. The de
sign of the Lyon Hydraulic Die Han
dling and Stacking Truck also includ
a two-speed hydraulic hand pump and
floor lock for holding truck in positio

Readily convertible from platform
boom truck to die separating device and
back to platform truck again, the truck
can also be made to other specifications
and capacities than those mentioned
above.

ANDERSON BALANCING WAYS

Pillow Block Type



A sub base can be made of proper height to give necessary clearance for large diameter work.

Supersensitive ball bearings and hardened and ground spindles assure accuracy.

Write for details.

ANDERSON BROS. MFG. CO.

1926 KISHWAUKEE ST.

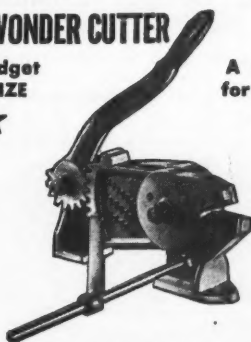
ROCKFORD, ILL.

THE WONDER CUTTER

A Midget
in SIZE



A GIANT
for WORK



Cuts wire, rods or band iron easily and quickly. Any size wire or rod up to $\frac{1}{2}$ inch round or $\frac{3}{8}$ inch square and band iron up to $\frac{1}{2}$ by 2 inches. Its small size and low price makes it possible to have more than one, mounted wherever convenient. Gauge can be set for repeated cuts of same length on both wire or band iron. Write for further information and prices.

THE FEDERAL FOUNDRY SUPPLY CO.

4606 East 71st St.

Cleveland, Ohio

"ABRASAW" Wet Cut-Off Machine

PRODUCES a smoother cut.

PRODUCES a greater number of cuts per disc.

REDUCES OR ELIMINATES burring.

ELIMINATES burning and surface hardening in most cases.

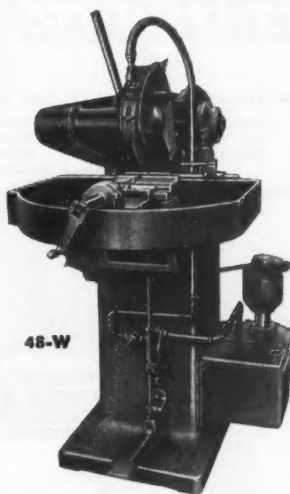
Capacity: No. 48-W—Solids up to $2\frac{1}{2}$ "

Tubing and light sections up to $3\frac{1}{2}$ "

diameter. Disc Sizes: Up to 16" diameter,

$1/16$ " to $1/8$ " thick, 1" arbor hole.

Also 47-W—Handles Solids up to 1" and tubings and light sections up to 2"



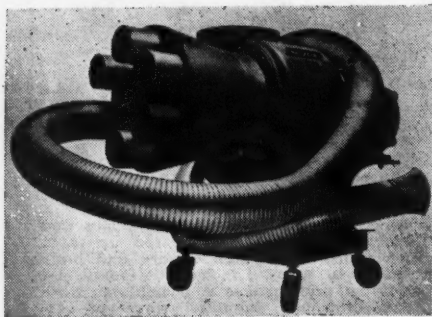
BRIDGEPORT SAFETY EMERY WHEEL CO., INC.

1297 W. BROAD ST.

BRIDGEPORT, CONN.

Chelsea "Octopus" Exhauster and Ventilator

An exhauster and ventilator specially designed for use in ship holds, mines, tunnels, and welding departments, to be



Chelsea "Octopus" Exhauster and Ventilator

known as the "Octopus," is announced by the Chelsea Fan & Blower Co., 1206 Grove St., Irvington, N. J. The unit may be placed or hung in any conveni-

ent location between the working area and the open air and is connected to the area to be ventilated by means of flexible metal hoses.

The Octopus is powered by means of a heavy duty ball bearing motor having overload protection, and is equipped with newly designed blower wheels. The unit can be easily converted from an exhauster to fresh air ventilator by simply changing the position of the tube adapter of the equipment. One to four of the nozzles can be used as desired. Caps are provided for all nozzles when in use.

Trojan "Elektro-Purj-It" Cleaning Compound

Known as "Elektro-Purj-It," a compound for use in cleaning windows and skylights, painted and varnished surfaces, lighting fixtures, soiled machinery, oily wood and cement floors as well as floors of other materials, cleaning and deodorizing washroom fixtures, and so on, has been placed on the market by Trojan Products & Mfg. Co., 3130 Wabash Ave., Chicago, Illinois.

According to the manufacturer, the

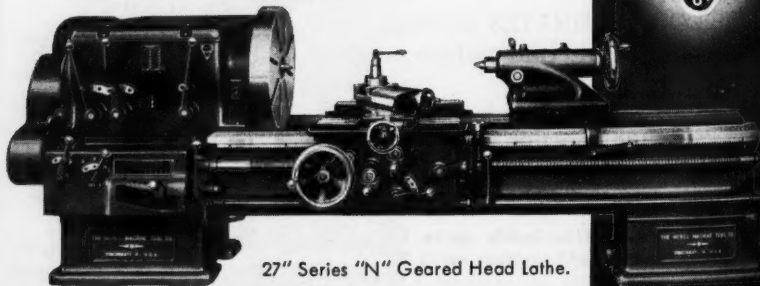
NEBEL Geared Head Lathes

A MODERN LATHE. ALL THE LATEST IMPROVEMENTS.

Timken Bearings
Self Oiling Headstock
Chrome Nickel Shafts

Quick Change Gear
Double Wall Self Oiling Apron
Quick Action Apron Levers
Thread Chasing Dial

We also manufacture a line of Removable Block and Extension Bed Gap Lathes.
Write for circulars.



27" Series "N" Geared Head Lathe.

The Nebel Machine Tool Co.
CINCINNATI OHIO

MILLI
MACH
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of New Arbor	Brown and
MA 13	
MA 10	
MA 11	
MA 12	

SCHUL
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109 EDIS

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November,

MILLING MACHINE ARBOR



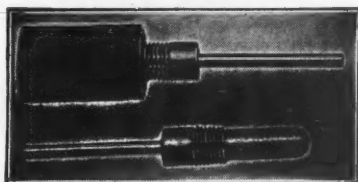
S. & A.
Milling Ma-
chine Arbors
are made of steel,
unhardened, carefully
fitted and accurately
sized with hardened nut—
without keyway.

No. of Arbor	Brown and Sharp Taper No.	Diam. of Arbor	Length of Shaft	Total Length	Diam. of Sleeves	Net Price Each
MA 13	9	1"	9	14"	1 1/2"	\$14.00
MA 10	10	1"	9	15 1/2"	1 1/2"	\$16.50
MA 11	9	1"	7	12"	1 1/2"	\$14.00
MA 12	10	1"	7	13 1/2"	1 1/2"	\$16.50

SCHULTZ & ANDERSON CO.
MACHINE TOOLS

109 EDISON PLACE NEWARK, N. J.

NEW FLEXIBLE ABRASIVE WHEEL



Designed for precision work. Used
for removing burs, fins, tool marks on
various types of production work. A
very indispensable aid in speeding
up production.

Write for catalog and free sample.

Field Abrasive Specialty Mfg. Co.
201 Lowe Bldg. Dayton, Ohio

Clamps Any Kind of Material Without Distortion

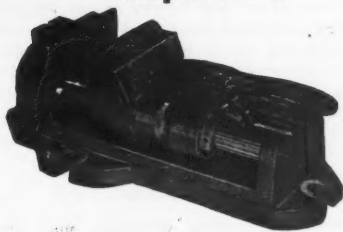
Here's a production vice that can be used as
safely with soft metals as with hard—be-
cause its jaw pressure is adjustable so as to
clamp the work without distortion.

Even though the parts that are being clamped
may vary in thickness, the jaw pressure is
always the same—never any harder on an
oversize part than on a regular size part.

In both milling and drilling operations, the
Presto-Vise speeds up production tremen-
dously because a single movement of the
lever causes the sliding jaw to travel from
"open" to "closed," or vice versa. And the
4 1/2" opening between the jaws makes it easy
to get the work quickly in and out of the vise.
Ideal also for use as a drill jig.

PRESTO-VISE

A Production Vise That Has a Pressure Adjustment



Free
CATALOG

D. A. SMITH & CO.

8085 Livernois

Detroit, Mich.

HOLDS THE BIG ONES



13"
Capacity

A BIG VISE FOR THE BIG Jobs

... and Precision, too!

It's new—larger—heavier—accurate! Designed and built to fill the need for precision on the big vise jobs. Note the heavy jaws, longer ways, broad base and extra swivel bearing surface of this Rousselle Victory Vise. Once swivel is set, it stays put! Built to cut set-up time in half—made in four sizes: 4½ in., 7 in., 10 in. and 13 in.

**Write for Bulletin MM92
and prices.**

Preference rating certificate must accompany orders.

**Dealers: A few select territories
still available.**

DAVID J. ROSS CO.
BENTON HARBOR, MICH.

compound is designed to remove weather film, oil, dirt, grease, grime, and so on, and is harmless to hands and clothing. To use, the material can be mixed with water and applied by means of cloth, mop, brush, machine.

Lincoln "Fleetweld 11" Arc Welding Electrode

An arc welding electrode designed to increase the speed of performing welding operations in war production.



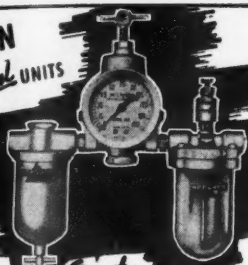
Illustration showing operator performing "Fillet" arc welding operation using Lincoln "Fleetweld 11" Arc Welding Electrode

and, at the same time, reduce operator fatigue to a minimum is announced by The Lincoln Electric Co., Cleveland, Ohio. The electrode, which is designated as the "Fleetweld 11," is designed expressly for use with the "Fleet-Fillet" technique of arc welding recently announced by the company.

The Fleetweld 11 is not only said to be a fast following electrode but to also provide deep penetration of metal joints.

NORGREN

Auto Control **UNITS**



Stamp Out

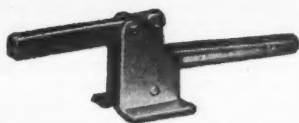
WEAR & CORROSION IN ALL AIR TOOLS

...clean the air, regulate pressures, automatically oil every working part with a fog of oil in the air that drives the tool! Guard against wear in use, against corrosion when idle. Many combinations to meet your particular needs.

Get Catalog 400

C. A. NORGREN CO. Denver, Colo.

DROP FORGED CLAMPS



Extra Strong—Longer Life

Products Engineering Company's quick acting jig clamps are the only drop forged clamps available—they're stronger—have exceptional opening and closing speed and a positive lock impervious to pressure and vibrations—it pays to specify them. Available in many models and sizes from midget to 6" clamping bars. Send today for file size catalog.

PRODUCTS ENGINEERING CO.

700 E. FLORENCE AVE., LOS ANGELES, CALIF.

LOOK AT THESE FIVE FEATURES!

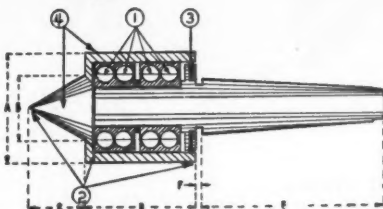
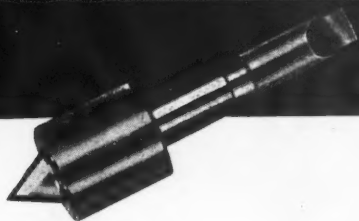
of QUADRO Precision LIVE CENTERS

FEATURES...

1. **FOUR ROWS** of precision BEC-4 specification bearings.
2. **SHORT OVERHANG** assures rigidity and accuracy—eliminates "chatter."
3. **Positive FELT-SEAL** excludes dirt and retains lubrication.
4. **HARDENED AND GROUND CONE.** Point accurate to within .0002".
5. **HEAVY DUTY.** Note combined radial thrust load at 100 r.p.m.

DIMENSIONS

Model No.	A	B	C	D	E	Combined Radial-Thrust Load At 100 R.P.M.	Net Price
3	1"	3/4"	3/4"	1 1/4"	2 1/2"	1600	\$23.00
3	1 1/2"	3/4"	3/4"	1 1/4"	3 1/2"	3300	\$25.00
4	2 1/4"	1 1/4"	1 1/4"	1 1/4"	4 1/2"	7500	\$35.00
5	2 1/2"	1 1/2"	1"	2 1/4"	5 1/2"	12000	\$47.00



All orders must be accompanied by extendable priorities.
WRITE TODAY!

FISHER TOOL CO.

226 LAFAYETTE ST. NEW YORK, N. Y.

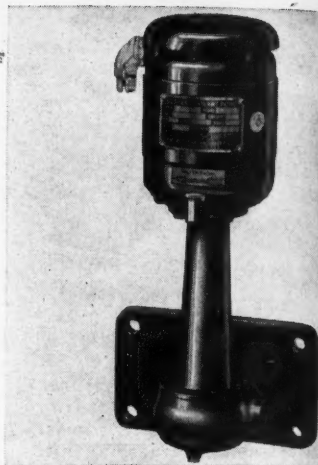
the joint being welded. The electrode is of the shielded arc type and is heavily coated to exclude oxides and nitrides from the weld, thus assuring high quality welds. In addition, by means of the electrode, a minimum of metal is said to be required in producing welds.

Designed to complete a weld in one pass, the Lincoln Fleetweld 11 Arc Welding Electrode is made in 18-inch lengths and diameters of $\frac{1}{8}$ and $\frac{1}{4}$ inch, and is supplied packed in 50-lb. cans.

Ruthman Model 5-P3 "Gusher" Coolant Pump

A vertical 1/10 h.p. motor-driven pump designated as the Model 5-P3 has been added to the line of "Gusher" coolant pumps manufactured by The Ruthman Machinery Co., 1817 Reading Rd., Cincinnati, Ohio. The pump has a capacity of 10 gallons per minute through $\frac{1}{2}$ -inch pipe at 5-foot head, and is available with the discharge opening located to the right or left. The unit illustrated has the opening to the right.

The impeller housing and mounting flange are cast in one piece. The mounting flange is of a large type so as to be



Ruthman Model 5-P3 "Gusher" Coolant Pump

interchangeable with larger size Gusher pumps; namely Models 11022, 11020C, and 11022E.

The driving motor is a full ball bear-



Jeremiah
called it a
GRAVERS TOOL



THE GREEKS
had a word for it ! . . .

Adamas
THE INVINCIBLE

Today we call them DIAMONDS

and as in the olden days they
are valued as the most precious
of human possessions

They possess qualities that withstand time and eternity and are today the same changeless, fascinating thing of beauty they were a thousand years ago.

Strange as it may seem powdered or crushed up diamonds used to be an important constituent in several remedies and in ancient times were even considered to possess supernatural qualities—the power of averting insanity and neutralizing poisons.

They have other uses however, of a strictly industrial character that are of more practical value to mankind.

IF YOUR WORK REQUIRES THE FINEST IN
ACCURACY AND WORKMANSHIP,
SPECIFY --

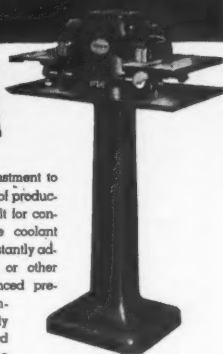


Swanson Tool & Machine Corporation
810 East 8th St., Erie, Pa.



The CRITERION Carbide Tool Grinder

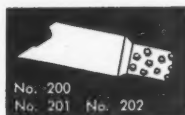
**GREATER
PRODUCTION
CAPACITY**



Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P. balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 grit 7" dia. steel backed silicon carbide wheels. Ideal for metal bonded or Resinoid bonded diamond wheels.

Order from your dealer or write direct. Request literature. No obligation.

CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA



No. 200
No. 201 No. 202

New

Diamonds set in special tungsten alloy which holds them until fully used up.

No. S3 3 stone tool.....\$ 9.00 each	No. S7 7 stone tool.....\$20.00 each
No. S5 5 stone tool..... 14.00 each	No. S15 15 stone—3 layers 25.00 each
IMPREGNATED DIAMOND TUNGSTEN TOOLS	
No. 200.....\$9.00 each	No. 201\$14.00 each
No. 202.....\$20.00 each	

Ask for Our Circular on Single Pointed Tools

CHAMPION

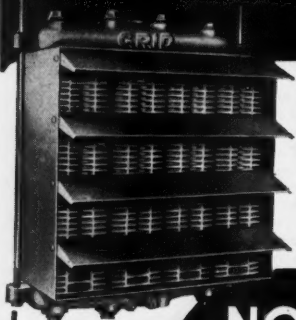
15 YEARS' EXPERIENCE

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INDUSTRIAL DIAMONDS AND DIAMOND PRODUCTS

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IT'S STILL A *different* UNIT HEATER



HIGH TEST
Cast iron takes the place of aluminum for the heating sections, to co-operate with the war effort in using substitute materials.

A special design for performance. Patent applied for. The new Grid is engineered along the same lines as the Grid Unit which had aluminum heating sections.

NOW
made with
CAST IRON
Heating
Sections

No corrosion—no leaks or breakdowns . . . In this new Grid Unit there is only one type metal in contact with steam or hot water. There is nothing to cause electrolysis that produces corrosion. Engineered and constructed to withstand up to 250 lb. steam pressure.

The new Grid Unit Heaters will give you years and years of dependable service, the same as the aluminum heating sections Grid Units—and many of these units now 14 years old are operating as efficiently as the first year. Ask for details now.

D. J. MURRAY MFG. CO.

WAUSAU, WISCONSIN

Established 1883. Offices in All Principal Cities

ing type with one-piece suspended shaft to the pump housing. Packing and mechanical contacts are eliminated. The seal between motor and pump is accomplished by the use of "lubri-sealed" ball bearings in direct conjunction with a centrifugal slinger. The impeller is the Ruthman patented twin equalized intake type which accomplishes hydrostatic balance. This feature also automatically cleans out the intake chambers when the discharge line is throttled, acting as an automatic by-pass which prevents building up pressure.

To mount, the Ruthman Model 5-Gusher Coolant Pump merely requires four cap screws and a communicating gravity inlet.

Apco Mossberg Improved Torque Wrench

Apco Mossberg Co., 112 Horton St., Attleboro, Mass., announces that its torque wrench is now available in four different sizes of dial instead

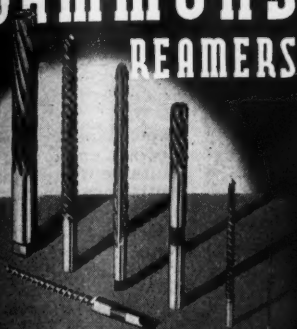


Apco Mossberg Improved Torque Wrench

two as heretofore. Ranges of the dials are as follows: 0 to 250, 0 to 600, 0 to 1,200, and 0 to 2,400 inch pounds.

With four sizes of dial and the calibration range of each limited, dial graduations are larger and more widely spaced, thus enabling them to be read quickly, easily, and accurately. The method of mounting the dial has also been improved. The dial is set in a special housing inside an extension of the handle of the wrench, thus making the dial unusually rigid and providing

GAMMONS REAMERS



Manufacturers of

The Gammons Helical Taper Pin Reamer
The Gammons Helical Chucking Reamer
The Gammons Helical Die Making Reamer
The Gammons Duplex Taper Pin Reamer
Special reaming problems invited.
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THE GAMMONS-HOAGLUND CO.
MANCHESTER CONNECTICUT



MAXIMUM LIGHTING EFFICIENCY . . .

when you combine Vimcolight directly on the work with fluorescent lighting overhead. Makes work safer . . . lessens eye fatigue . . . reduces spoilage. Hundreds of America's finest machine tools are VIMCOLIGHTed. Are yours?

VIMCOLIGHT

VIMCO MANUFACTURING CO.
111 CHENANGO ST. BUFFALO, N. Y.

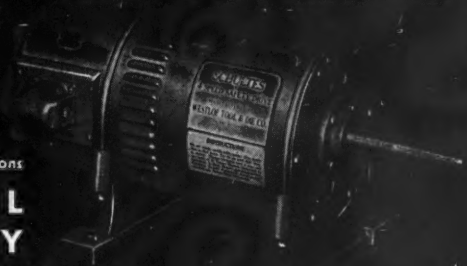
"SCHULTES" . . . The King of Motor Drives!

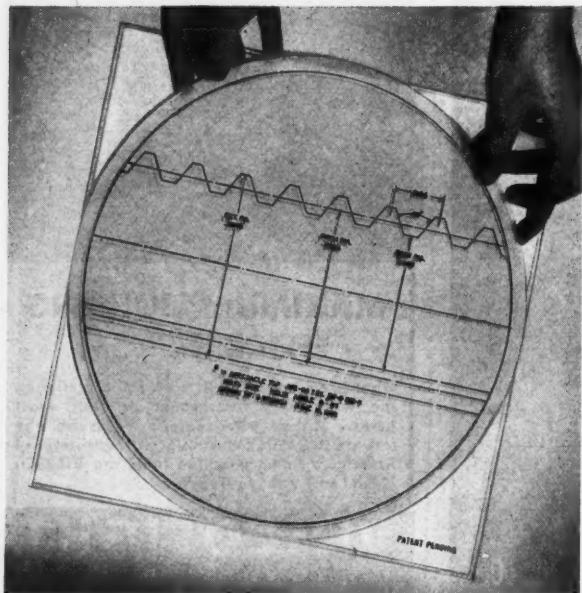
ALL HELICAL GEARED, UNSUR-
PASSED IN POWER, EFFICIENCY,
SAFETY AND COMPACTNESS

Write for Complete Detailed Specifications

**WESTLOF TOOL
& DIE COMPANY**

4190 BELLEVUE AVE. • DETROIT, MICH.





Circular Engineer's-Glass transparency of ground glass laid over original ink design of "Engineer's-Glass"

better protection from bumps and shocks which may knock it out of adjustment. Operating accuracy of dial is guaranteed to 98 per cent.

Universal "Engineer's-Glass"

Designed to fulfill the need for a medium whereby the outline diagrams placed on ground glass or other screen material can be drawn with a very high degree of accuracy and duplicated many times from a master drawing in a form and size as exact as the original, a plate-glass material $\frac{1}{8}$ inch thick on which

then inked by the usual tracing methods and sent to Universal where it is reproduced in the form of a transparency of clear glass with opaque lines, which can be placed in contact with the ground surface of the ground-glass screen of the contour measuring projector. This transparency is available in "right" or "mirror" (reversed) image types. If the contour measuring projector has a clear-glass screen, the transparency can be made of ground glass. This places the silhouette and the lines of the diagram in the same plane and both can be readily seen and examined. If a permanent set-up is desired, the Engineer's-Trans-

is permanently mounted on good linen drawing paper suitable for drawing with both pencil and pen. The plate-glass material which is known as "Engineer's-Glass," can also be obtained in thicknesses of $\frac{1}{4}$ inch on special order.

After a diagram of the tool or part to be checked in a contour measuring projector has been pencilled on the paper of the Engineer's-Glass and the diagram check in the projector with a part known correctness, it is



Increase Production With CURVE TOOTH CUTTERS

Woodruff Keyway, Plain Milling

Enjoy the Advantages:

- | | |
|--------------------------|--------------------|
| More cutting edge | Gives shearing cut |
| Cuts 50% faster | Easy to sharpen |
| More cuts per sharpening | |

Write for Details.

ABER ENGINEERING WORKS, INC., Waterford, Wis.

GRANT

RIVETERS



• Pioneers in the riveting field. Head rivets from smallest to $\frac{1}{2}$ " diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles.

Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.

96 Stillman Ave.

Bridgeport, Conn.



Industry's Newest Tool . . .

MEAD BANDSANDER

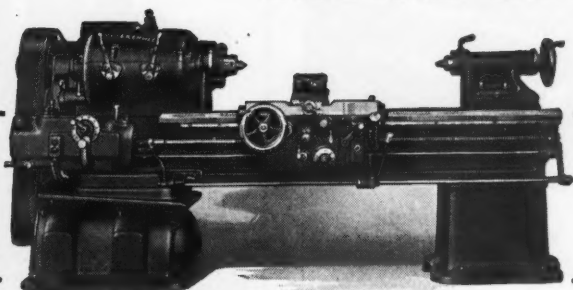
It is a time, labor and money saver on innumerable jobs in any shop. Sharpens tools, cutters, etc., of many "kinds." F.O.B. Chicago, \$14.95.

MEAD SPECIALTIES CO.

15 S. Market St. Dept. 11-A Chicago, Ill.

BOYÉ & EMMES

ENGINE LATHES



THE BOYÉ & EMMES MACHINE TOOL CO.

CINCINNATI

OHIO

parency can be made to fit the screen holder of the projector, the regular screen of the projector being removed and the transparency substituted.

In some instances, it may be desirable to use a diagram on the projector without having an Engineer's-Transparency made. For this purpose, Engineer's-Glass on which is cemented a thin translucent vellum paper instead of the more opaque drawing paper can be obtained.

Engineer's-Glass is available in standard sizes of 6 x 9, 8 x 10, 10 x 12, 11 x 14, 14½ x 14½, 16 x 20, 15 x 15, 18½ x 18½, and 30 x 30 inches. Other sizes can be obtained on special order. According to the manufacturer, Engineer's-Transparencies are designed to withstand handling with greasy fingers, can be easily cleaned, do not shrink, stretch, or buckle, can be returned for recoating, can be filed for future use, and are readily replaceable.

Knu-Vise L-Clamp

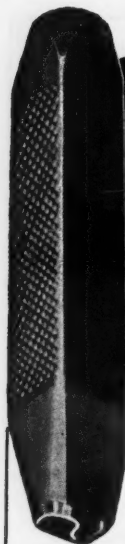
To meet the need in aircraft construction for a more satisfactory device for holding L-sections, Knu-Vise, Inc., 2201



Knu-Vise L-Clamp

Eighth St., Detroit, Mich., has developed the L-clamp shown in the accompanying illustration. The design of the clamp is said to make it very useful in limited areas or where a large throat capacity is required. Handles are at right angles to clamping position.

The Knu-Vise L-Clamp can be used in any position and does not project into space, thus eliminating any ob-



- ◀ Special Anti-Mushrooming Anti-Chipping Heat-Treat
- ◀ Oversize Shanks
- ◀ Exclusive Knurled Back
- ◀ Exclusive Thumb Grip
- ◀ Broach-Rounded Corners

A Complete Engineering Service on Marking Devices

Write for Price and Data Bulletin No. 113-12

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit

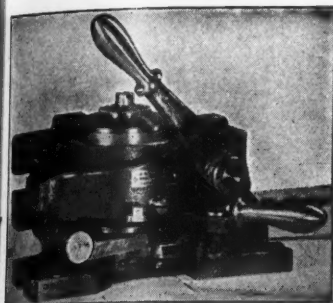
Hand Cut ROTARY FILES

High Carbon and High Speed Steel
All sizes—all shapes. Write for catalog



STRATFORD

CONN.



DEARBORN Automatic Chucking and Indexing Fixture

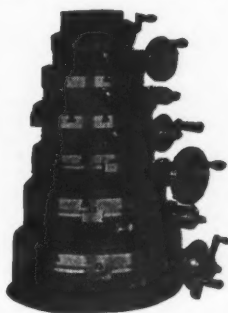
MILLS OVER 1000 PARTS PER HOUR

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

J. W. DEARBORN

70 S. CLIFF ST. • ANSONIA, CONN.

Troyke Rotary Tables



Sizes 9", 12", 15", 18"

Ask your dealer or write us for
eight page catalog.

ALFRED A. TROYKE

4422 Appleton St. Cincinnati, Ohio

The Holder That Compensates for Spindle Misalignment!

Eliminates Over-Size and Bell-Mouthed Holes

To produce uniform and accurately tapped and reamed holes, when spindles are out of alignment with the work, is child's play if you use a Ziegler Floating Tool Holder—because the Ziegler Holder is specially designed to compensate for faulty spindle alignment. Consequently it not only reduces set-up time but also eliminates spoilage losses due to inaccuracies in set-up.

When you use a Ziegler Holder, you'll be amazed how perfectly it floats. No friction or cramping, even under the severest tool-driving strains. Takes any and all end-thrusts. Prolongs the life of tools. Send for detailed information.



W. M. ZIEGLER TOOL CO.

1920 Twelfth St.

Detroit, Mich.



FLOATING HOLDER
for Taps and Reamers...

Write for
CATALOG

struction. A rubber cap provided on the part of the clamp which contacts the work prevents the clamp from slipping and marring of highly polished surfaces.

"MX" Wheels

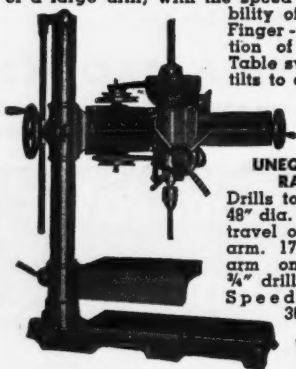
Known as "MX" Wheels, a line of abrasive wheels consisting of thin discs of cotton fibers intimately impregnated or mixed with either uniformly graded grains of Aloxite Brand aluminum oxide or Carborundum Brand silicon carbide



"MX" Wheels

MUNDING BENCH RADIAL DRILL

Combines the convenience and accuracy of a sensitive drill, the range and capacity of a large drill, with the speed and flexibility of a radial. Finger-tip selection of speeds. Table swivels and tilts to any angle.



UNEQUALLED RANGE

Drills to center of 48" dia. circle, 18" travel of head on arm. 17" travel of arm on column. $\frac{3}{4}$ " drill capacity. Speeds: 175 to 3675 r.p.m.

Write for details.

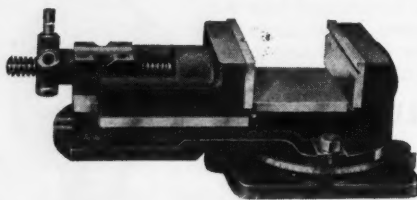
MUNDING MFG. CO.
703 East Colorado Blvd. Glendale, Calif.

is now being offered by The Carborundum Co., Niagara Falls, N. Y. The discs are bonded together or built up the form of wheels of various diameters and thicknesses, and are so fabricated as to provide variable degrees of efficiency and flexibility. The result is a clean free-cutting wheel which provides a light stock removing and high polishing action with a minimum of wheel pressure.

MX Wheels are designed for use without any coolant and can be used with any type of flexible shaft machine or electric hand grinder. The wheels are especially constructed for mounting between relieved flanges, and should be dressed with an abrasive stick as required.

MX Wheels are recommended for

GEM DRILL PRESS AND MACHINE VISES...

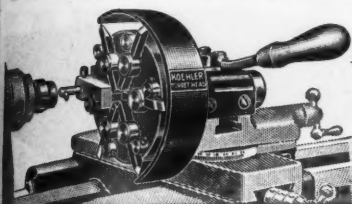


Modern Vises for Tool-room and Production. Sizes ranging from 3" to 10 $\frac{1}{2}$ " opening. Strong, Versatile, Quick-Acting. Pay for themselves in time-saving.

Write for circular describing entire line of GEM MACHINE VISES.

J. E. MARTIN TOOL & DIE WORKS
548 State St. Springfield, Ohio

KOEHLER TURRET HEADS



An Introduction to Increased Production

Convert your engine lathes to semi-automatic Turret Lathes.

6-TOOL TURRET HEAD—

uses 5/16" tool-bits—fits most 9" to 12" swing lathes.

8-TOOL TURRET HEAD—

uses 3/8" tool-bits—for lathes of 12" swing or more.

Tool-bits independently adjustable.

Write for illustrated folder and prices.

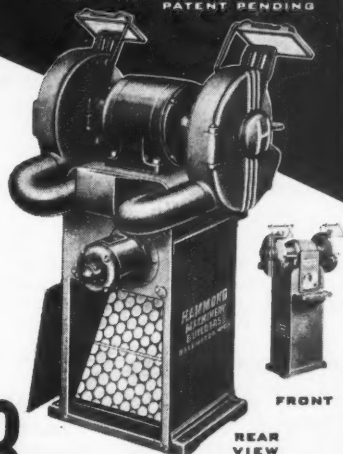
MASTER MACHINE CO.

19 Grove Street

Stamford, Conn.

Hammond OF KALAMAZOO NO-DUST* GRINDERS

PATENT PENDING



FRONT

REAR
VIEW

3 POPULAR SIZES FOR 10" 12" 14" WHEELS

*COMPLETELY SELF-CONTAINED GRINDER AND DUST COLLECTOR

SAVE SPACE—Only 6½ sq. ft. where average grinder and independent dust collector take almost 15½ sq. ft.

SAVE TIME—Set up anywhere near electrical outlet and put it to work.

SAVE "MAN-HOURS"—Protect health, keep 'em working.

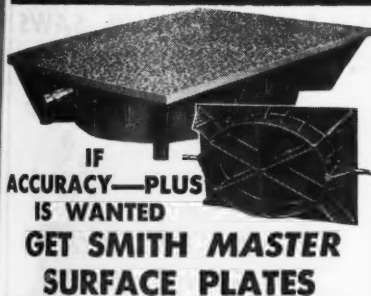
Other Hammond Products: Carbide, Tool, Snagging Grinders; Abrasive Belt Surfactors; Cylindrical Finishing Machines; Polishing Lathes, Rotary Automatics

Hammond
Machinery Builders
INC.

★★★ 1615 DOUGLAS AVENUE ★★★

KALAMAZOO • MICHIGAN

Eastern Branch — 71 West 23rd Street, New York, N. Y.



**IF
ACCURACY—PLUS
IS WANTED
GET SMITH MASTER
SURFACE PLATES**

Smith Surface Plates will give you the maximum freedom from distortion with a minimum of deflection. Original design insures ample rigidity and stiffness for accurate measuring. Smith Surface Plates are satisfactorily meeting the tests of the country's leading precision toolmakers. You'll want detailed information and descriptive literature. Sent free on request.

SMITH TOOL & ENGINEERING CO.

(Formerly Smith Tool Works, Inc.)

849 N. Sandusky Ave.

Bucyrus, Ohio

Available Sizes

8" x 12"
9" x 14"
12" x 18"
18" x 24"
18" x 18"
20" x 30"
24" x 24"
24" x 36"
30" x 36"
30" x 60"
36" x 68"

Other sizes
made on
order.

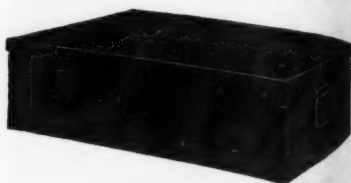
eration at speeds ranging from 6,000 to 8,000 surface feet per minute and are made in six grades, designated as the Nos. 1, 2, 3, 4, 5, and 6. The harder grades, Nos. 1, 2, and 3, are recommended for use in performing operations where the work has a more severe dressing action on the wheel, such as in removing sharp burs, breaking down edges of gears, and so on. The Nos. 4, 5, and 6 are recommended for the polishing of small plane surfaces or areas.

MX Wheels are made in grits of 50, 80, 120, 180, and 320 and are said to be particularly adaptable for finishing and polishing out-of-the-way places on airplane engine parts, finishing and polishing spline grooves, finishing out depressed areas, polishing internal diameters, smoothing down sharp edges of holes, and so on.

American Style 200 Straight Side Shop Box

American Metal Works, Inc., 1519 Germantown Ave., Philadelphia, Pa., announces the addition of a straight side shop box, designated as the Style 200, to its line of steel shop equipment. The

box is made of 20 gauge steel and is available in two standard sizes of 12 inches wide x 9 inches long x 3 1/2 inches



American Style 200 Straight Side Shop Box

high and 8 inches wide x 12 inches long x 4 inches high. The box can also be made in other sizes or gauges of metal if required.

Cadet Protector Creme

Designed for use by war workers and others whose work causes contact with certain acids, oils, greases, paints, solvents, thinners, soot, and so on, a skin protection cream to be known as Cadet

The HAMILTON
MUEHLMATT
Super Sensitive
DRILLING MACHINE

SMALL DRILLS
are too
precious to
abuse . . .

SAVE THEM . . .
Use this machine instead

Precision - built for finest work. For holes from .004 to 5/16 dia. For production or research; singly or arranged in multiples.

Write Dept. S-11 for bulletins.

THE HAMILTON TOOL CO.

SHARPEN YOUR SAWS QUICKLY -- ACCURATELY

Hack, band, circular and slitting saws can be sharpened at a speed of 83 teeth a minute... on the Howe-Lindsey Automatic Saw Sharpener. Any size hack or band saw; circular saws up to 20" diameter; metal slitting saws and milling cutters up to 5/16" face.

Write for folder.

Howe & Son, Inc., Hinsdale, N. H.

SPEED-UP PRODUCTION

WITH

FAMCO FOOT AND ARBOR PRESSES



Production will win the war. Step-up your production and assembly operations requiring percussion and pressure with FAMCO Presses. 40 STOCK SIZES AND MODELS.

Write for details.

FAMCO MACHINE CO.

1324 18th St., Racine, Wis.

famco FOOT AND ARBOR PRESSES

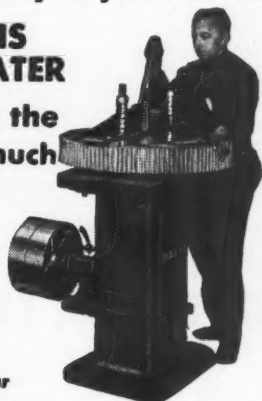
Why Use A Shaper to cut Keyways when a

DAVIS KEYSEATER

will do the
job so much

quicker
and
better?

Send
for
Circular



DAVIS KEYSEATER CO.

Exchange and Glasgow Sts.
ROCHESTER, N. Y.

"MEN WORKING TOGETHER" "TIME IS SHORT"



IF THESE WAR SLOGANS ARE TRUTHS
—WHY WASTE THAT PRECIOUS TIME
—THAT SKILLED LABOR—WHEN ANY
BOY CAN SHARPEN DRILLS?

BLACK DIAMOND PRECISION DRILL GRINDERS

Motor driven, these highly efficient Black Diamond Grinders are doing yeoman service in hundreds of large and small war production plants throughout the country.

They not only produce quantities of perfectly sharpened small gauge and fractional drills, with lips of uniform length, correct angle and proper clearance for true, accurate drilling—but release skilled mechanics for more important work.

The Web thinner, an important attachment, cares for the proper grinding of Notched, Colton or so-called Crankshaft points . . . and the diamond dresser keeps the grinding wheel always sharp.

Write for Bulletin 122

BLACK DIAMOND SAW & MACHINE WORKS, INC.
NATICK, MASS.

Protector Creme is now being marketed by the Cadet Creme Co., 151 Farrar Ave., Worcester, Mass. This greaseless, velvety textured cream applied on the clean skin before doing any work dries to form an unseen film or protective coating which is said to prevent all non-water carrying substances and grime from adhering to the skin and clogging the pores.

Carbon tetrachloride, Solvasol, ether, naphtha, thinners, and other similar materials, it is claimed, do not dissolve or penetrate the protective coating to defat the skin or to cause dermatitis. The protective coating is said to last at least four

hours and can be removed with a small quantity of water.

Lyon Adjustable Wood Shelving

Due to steel priority, Lyon Metal Products, Inc., 3074 Clark St., Aurora, Ill., announces that it is now offering its line

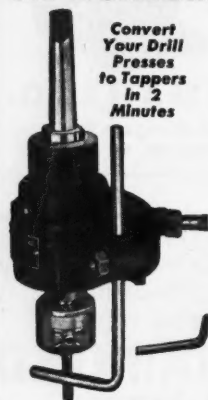


Lyon Adjustable Wood Shelving

of quickly adjustable shelving in wood for the duration. This shelving is made in open and closed types.

Sections are 36 inches wide and 84 and 96 inches high, and may be obtained in 12, 18, or 24-inch depths. Top, base

PROMPT DELIVERY ON DORMAN TAPPERS



Convert
Your Drill
Presses
to Tappers
in 2
Minutes

Adjustable Friction Drive No. 1 Tapper drives smallest tap in softest material to $\frac{3}{16}$ " tap in steel.

No. 2 Tapper Drives from $\frac{3}{8}$ " to $\frac{1}{2}$ ".

No. 3 Tapper Drives from $\frac{1}{2}$ " to 1" in steel or other material.

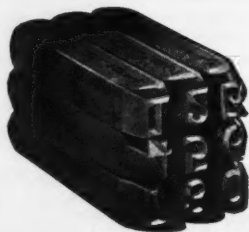
Simple adjustment changes from light friction to positive drive or any intermediate stage on No. 1 size.

Write for details.

Dorman Machine Tool Works

357 CANAL ST.

NEW YORK, N. Y.



THOR STAMPS LAST LONGER

You get more marks per dollar with THOR STAMPS. They're made of correctly-heated alloy steel. Central striking point gives uniform indentation. Thumb side marking makes them easily read—easily used. Write for catalog.

THE PITTSBURGH STAMP CO.

812 CANAL ST.

PITTSBURGH, PA.



Send for
Valuable
Booklet
Forgings
for All Industries

Rough Turned or
Finished Complete

Composite Die Sections, Extrusion Tools,
Crankshaft Forgings, Gear Forgings, Die Casting
Dies.

Rings, Discs, Blocks, Shafts, Hubs, Bars, and
Special Shapes. Tool Steel of All Makes.

S.A.E. Specifications.

Stainless and Copper Forgings.

MAY WE SERVE YOU?

AJAX STEEL & FORGE CO.
205 ADAIR ST. DETROIT, MICHIGAN

LUMA
Patented

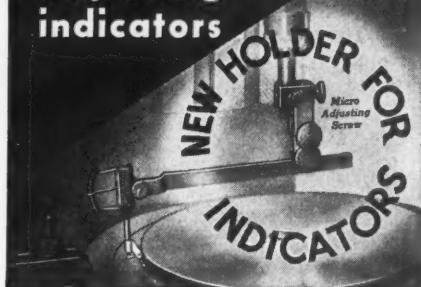


Combination Demagnetizer and Electric
Etching Pencil. Marks symbols in hard-
est steel. Demagnetizes instantly.

One of our models popular in tool rooms
for 15 years.

Luma Electric Equipment Co.
DEPT. M5 TOLEDO, OHIO

Save 60%
TIME spent
adjusting
indicators



For Jigborers, Boring Mills, Milling Ma-
chines. It fits all popular indicators. The
above illustration shown complete with
extension bar.

NO more tiresome tapping your indi-
cator into position. Now — after
locking to approximate position, you
obtain final setting by simply turning
Micro Adjusting Screw. This exclusive,
time-saving feature of the OSLUND
HOLDER for all popular indicators
gives you **complete control**. Write
today for details.



Another Time-Saver

This Holder produced by mak-
ers of Oslund Indicator — the
shockproof, constantly accurate
indicator, whose 360°
dial is read from **all**
sides. Write Oslund
today.

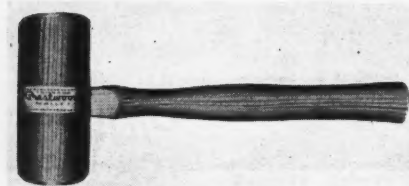
Oslund
TOOL & DIE CO.
14 Sigourney St.
Hartford, Conn.

shelves, braces, arms, and uprights are made of solid hardwood. Side panels and back panels of closed type shelving are made of $\frac{1}{4}$ -inch plywood. All parts are finished with a green tinted preservative coating to reduce moisture absorption.

Features of Lyon Wood Shelving include dividers, bin fronts, adjustable shelves, and shelf boxes.

Tornado Prestwood Mallet

Illustrated herewith is the Tornado Prestwood Mallet which has been an-

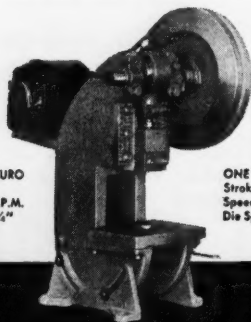


Tornado Prestwood Mallet

nounced by the Breuer Electric Mfg. Co., 5100 N. Ravenswood Ave., Chicago,

PUNCH SMALL PARTS FASTER

DURO, aircraft type, punch presses are constructed to precision punch aluminum, dural, and other sheet metal and plastic. Write today for illustrated catalog on Duro Punch Presses, Bench Milling Machines, and Accessories.



FOUR TON DURO
Stroke - 1"
Speed 285 R.P.M.
Die Space - $4\frac{1}{4}$ "

ONE TON DURO
Stroke - $\frac{3}{4}$ "
Speed - 220 R.P.M.
Die Space - $3\frac{1}{4}$ "

DURO MANUFACTURING CO.

Punch Presses . . . Milling Machines . . . Accessories
800 EAST 61ST STREET • LOS ANGELES, CALIFORNIA

Ill. Made of wood chemically treated and reduced in size under extreme pressure, the mallet is said to be of suitable hardness for performing all types of driving, straightening, and hammering operations. In addition, the mallet is said to be non-splintering and retentive, thus making for long life, and is available in three sizes and weights.

"Kut Kost" Cutting Alloy

Known as "Kut Kost," a cutting alloy containing a high percentage of tungsten and cobalt and 1 per cent boron together with other metals is now being introduced by the General Tool & Die Corp., 555 Prospect St., East Orange, N. J. The material is centrifugally cast at very high speed, thus making it extremely dense and tough, and is supplied in three grades, Grades V, X, and XT, having different Rockwell "C" hardnesses.

Grade V has a hardness of 61-63 Rockwell "C" and is designed for heavy roughing cuts on ferrous metals with feeds of $\frac{1}{16}$ to $\frac{1}{8}$ inch. Grade X, which is designated as a general purpose grade, has a hardness of 65-67 Rockwell "C" and is designed for use in semi-

A GIANT WORKER

SAVES THOUSANDS OF HOURS DAILY



GROB

FILING MACHINE

"THE TOOLMAKERS' BEST FRIEND"

INDISPENSABLE in every shop. It cuts with a continuous flow of chips and removes stock like a milling machine FASTER PRODUCTION WITH GREATER ACCURACY

Write or wire for details and prices

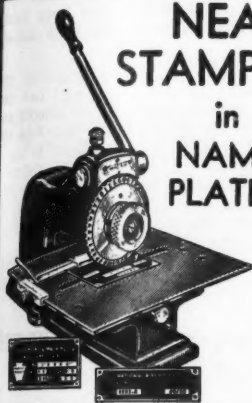
REGISTERED TRADE MARK

GROB BROTHERS

GRAFTON WISCONSIN

NEAT STAMPING

in
NAME
PLATES



Nameplate Detail Press

This machine quickly stamps details and serial numbers into name plates.

Write for Particulars

GEO. T. SCHMIDT, Inc.
1806 Belle Plaine Ave. Chicago, Ill.

YOUR FIRST LINE OF DEFENSE against HIGH SHARPENING COSTS No. 57T

Automatically
Sharpens
Metal Saws in
gangs up to 8"
in diameter.

Takes gangs up to
3 1/2" thick. The saws
are automatically in-
dexed and sharpened
within variation of
plus or minus .001 of
exact diameter of
entire lot.



Write for
Folder 57T.

THE WARDWELL MFG. CO.
3166 FULTON ROAD CLEVELAND, OHIO

...TOOLS·DIES· JIGS·FIXTURES

**ELECTRIC
WELD**

Production "speed up"
starts in the tool shop.

Electric welding will
get these items out faster and
cheaper than any other meth-
od by short-cutting most time consuming
and costly drilling, tapping, machining
and delicate layout work. Save critical
tool steel by hard-surfacing only the cut-
ting edges.

Send for free, 24 page,
illustrated booklet.

MARQUETTE MFG. CO., INC.
Minneapolis, Minn.

MARQUETTE

REG. U.S. PAT. OFF.
A.C. ARC WELDERS

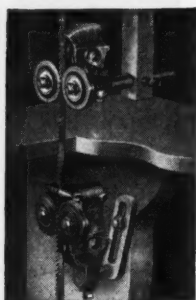


finishing and medium roughing ferrous materials and for heavy roughing cuts on nonferrous materials. Feeds recommended on ferrous materials range from 0.010 to $\frac{1}{16}$ inch. Those on nonferrous materials can be any desired, depending upon the feed the machine will withstand.

Grade XV has a hardness of 68-70 Rockwell "C" and is recommended for finish cuts on ferrous metals and for general duty cutting operations on nonferrous materials, such as copper, aluminum, brass, bronze, and so on. A special Grade XX is also available which

has a hardness of 72-75 Rockwell "C" and is recommended only for very light cuts on ferrous and nonferrous materials.

Kut Kost Cutting Alloy requires no special wheels for grinding but can be ground by the same abrasive wheels as used on high speed steel tools. Due to the scarcity of alloys, Kut Kost is supplied as a solid bit only in the following sizes: $\frac{1}{4}$ x $\frac{1}{4}$ 2 inches, $\frac{1}{8}$ x $\frac{1}{8}$ x 2 inches, $\frac{3}{8}$ x $\frac{3}{8}$ x 3 inches, and $\frac{1}{2}$ x $\frac{1}{2}$ x 4 inches. All bits larger than these will be supplied with Kut Kost tips only.



PADDOCK Ball Bearing BANDSAW GUIDES

Reduce Blade
Breakage
Increase
Production

Easily adjusted to all sizes of blades to $1\frac{1}{2}$ " wide.

Recommended for new and old machines running at any speed cutting all materials.

Shipped on 10 day approval

PADDOCK TOOL CO.

1418 Walnut St. Kansas City, Mo.

Knu-Vise Improved Model KP-839 Midget Toggle Clamp

Shown here is the Knu-Vise Improved Model KP-839 Midget Toggle Clamp which is now being introduced by Knu

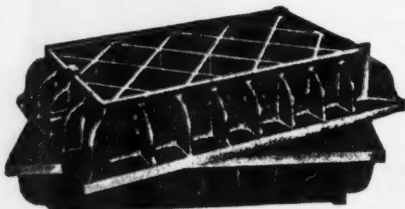


Knu-Vise Improved Model KP-839 Midget Toggle Clamp

Vise, Inc., 2201 Eighth St., Detroit, Mich. With the bolt retainer of the unit now made an integral part of the toggle bar, variations in spindle position are eliminated.

The clamp, though small, is unusually powerful and is particularly recommended for use where heavy clamping pressure is required in holding small parts.

REID PRECISION-PLANED SURFACE PLATES



Accuracy guaranteed on 12" x 18" size within .0005". On 36" x 72" within .0015". Thoroughly normalized and weather seasoned Reid Precision-Planed Surface Plates have proved thoroughly satisfactory on work to close limits.

Excellent delivery—Write for prices—details.

Tool Engineering Service Co., Inc.
241 Washington Ave. Nutley, N. J.

well "C"
very light
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KP-833

Improved
Clamp
by Kane



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inc.
M. A.

, 1942



The Everede Boring Bar Holders are adjustable to fit various size lathes. (Bushings are furnished with each boring bar for use in the Holders.) Everede Holders keep the boring bar in a horizontal position, regardless of any change in the size of the lathe, within limits. • The No. 1 Holder for lathes from 7" swing to 9". • The No. 2 Holder for lathes from 8" swing to 12", and the No. 3 Holder on engine lathes from 12" swing to 24".

Send for descriptive folder.

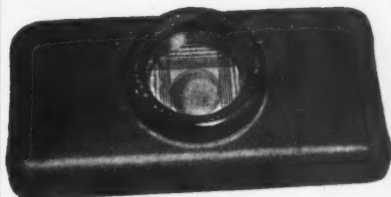
EVEREDE TOOL CO.

WILLIS STUTSON

180 N. WACKER DRIVE, CHICAGO

Representatives in principal cities

"ALL-WAY" LEVEL



The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .0005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES

5 1/2" x 12"

3 1/2" x 6"

Write for Bulletin

WM. B. FELL CO.

702 SOUTH ST.

ROCKFORD, ILL.

AUTOMATIC STAKING MACHINE

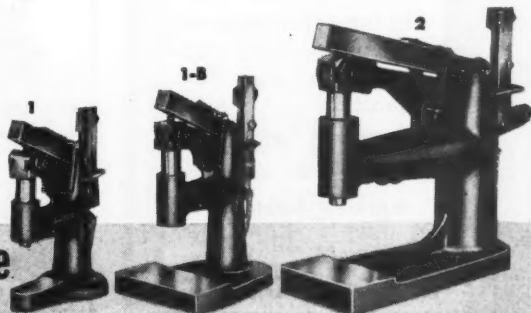
for Work that Cannot Be Done on Conventional Riveters

Ideal for riveting movable joints, as blow of trip hammer is always uniform and can be adjusted to hit proper blow for job at hand. Work is held firmly by pressure pad while being struck by hammer.

The most efficient device available for pointing with platinum, tungsten, or silver. Fast and accurate.

	1	1-B	2
Stroke 2"	2"	2 1/2"	
Spindle 1"	1"	1 1/4"	
Throat			
Depth 4 3/4"	4 3/4"	8 1/2"	

Write for folder.



Weber Machine Corporation

59 RUTTER ST., ROCHESTER, NEW YORK

"Rex" Babbitt Metal

To meet the tin shortage, National Bearings Metal Corp., 5000 Manchester Ave., St. Louis, Mo., has developed a babbitt metal having a special base



"Rex" Babbitt Metal

which enables the composition of the metal to meet, with a minimum sacrifice of tensile and compressive strengths, Government specifications restricting the tin content of all babbitt metals to 12 per cent.

Properties of the metal, which is known as "Rex," are as follows: tensile strength, 8,200 lb. per square inch; elongation in 2 inches, 1.2 per cent; red

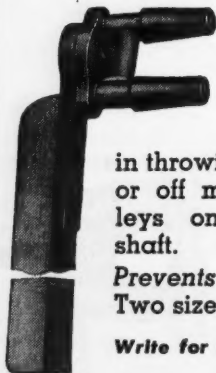
in area, 1.8 per cent; compressive strength, 17,500 lb. per square inch; specific gravity, 9.60; hardness, 25 Brinell; proper pouring temperature, 625 to 675 deg. F. To assist users in the proper application of Rex Babbitt Metal, the company has available a "Successful Re-Babbitting Chart."

Rotor Tool Conservation Plan, Part II

The Rotor Tool Co., Cleveland, Ohio, announces that material on the second part of the tool conservation plan described on Page 340 of the September issue of MODERN MACHINE SHOP is now available. This material includes a poster and 12-page booklet, "Keep 'Em Working," on the maintenance and conservation of high cycle electric tools.

The booklet stresses the importance of periodic checks of high cycle tools and provides a separate section on tool maintenance for the electrical engineer. The procedures suggested in this section are quite simple but effective and direct the attention of the electrical engineer to the simple things he should do to maintain maximum efficiency and production from high cycle electric tools.

SAFETY FIRST



in throwing belts on or off moving pulleys on the line shaft.

Prevents accidents.
Two sizes.

Write for Catalog S-42.

THE READY TOOL CO.
510 IRANISTAN AVE. BRIDGEPORT, CONN.



Standardized Die Sets, embodying many exclusive features, a listing of more than 195,000 stock sizes and 46 different styles afford a service that is unsurpassed.

Send for Our New Catalog
E. A. BAUMBACH MFG. CO.
1806 S. Kilbourne Ave. Chicago, Ill.

impressive
inch; ap-
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Plan.

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UNIVERSAL FIRST COMPANY IN AMERICA TO WIN COV- ETED 20% BOND FLAG

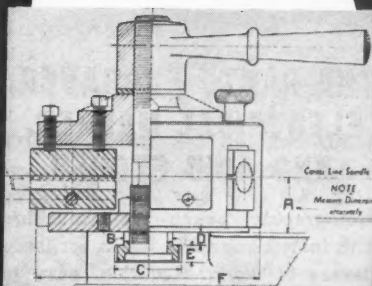
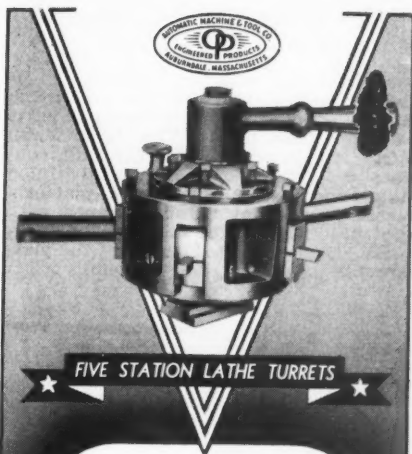
When each of the 550 of us here at Universal helped give the Allied cause a boost by being America's first industrial plant to subscribe 20% for War Bonds we were mighty proud.

But we're even more proud of the big volume of precision built drill bushings we're turning out daily to help America's arms production.

Universal drill bushings (such as the one shown here) are straight and round with superfinished bores which assure accuracy and unexcelled wearing qualities. Write for facts.



UNIVERSAL
ENGINEERING COMPANY
FRANKENMUTH, MICH.

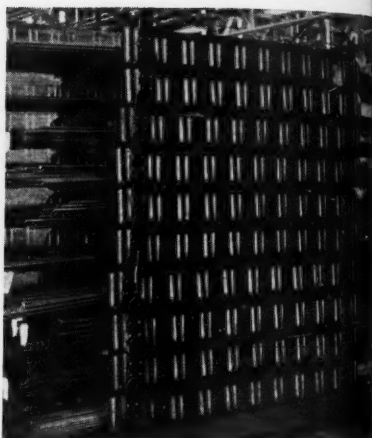


Index plate has 10 stops for 10 different tool settings. Bottom half of tool block oscillates in turret body and allows for minute adjustment of tool. Two set screws rigidly hold boring bar or tool bit. Tool blocks are interchangeable in 5 positions. Save tool bits and increase production at lower costs. Write for folder today!

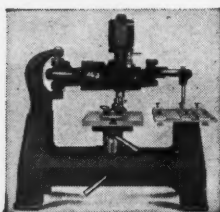
**AUTOMATIC
MACHINE & TOOL CO.**
132 CHARLES ST.
AUBURNDALE, MASS.

Union Metal Materials Handling Unit for Long Bars

A materials handling unit which is said to be ideal for the movement and storage of long bars or odd shaped parts has been developed by The Union Metal Mfg. Co., Canton, Ohio. The unit consists essentially of a standard Union Metal open-end all-steel skid platform turned upside down and equipped with eyed brackets for the insertion of crane hooks. The corrugated design of the platform is said to give the unit great



Union Metal Open-End Skid Platforms Inverted to Form Bar Rack



**For
rapid
Precision
marking...**

THE PANTO ENGRAVER, ELECTRICAL MARKER, AND ACID ETCHER

Pantographic bench-type machine with interchangeable heads for three classes of work. Accurate, easy to operate, built for long reliable service.

» Write for literature

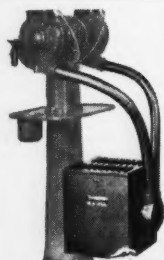
H. P. PREIS ENGRAVING MACHINE CO.
149A SUMMIT ST. NEWARK, NEW JERSEY

strength and durability.

Designed for the speedy handling of materials within a plant or between plants, the unit can be obtained in various sizes to meet individual requirements.

"Mitts" Protective Skin Cream

A water soluble cream which can be applied to the hands or other exposed parts before starting work for protection purposes, to be known as "Mitts," has been placed on the market by the Mitts Mfg. Co., 376 E. 45th St., Brooklyn, N. Y. The cream is said to dry quickly and acts as an invisible glove which protects the hands from grease, paint, ink, and other materials difficult to remove. The cream is also said to



Collect Grinder DUST with DUSTKOP!

Pulls dust away from grinding wheels and returns cleaned air to room. Complete self-contained dust-collecting system. DUSTKOP is operated by GE 1/4 hp. continuous duty motor, driving multiple-blade fan. Compact, portable, low-priced.

AGET-DETROIT MFG. CO.

2046 BOOK TOWER CADILLAC 3090 DETROIT

• Write for
Bulletin
A-500

**TO HELP
YOU TEACH
THE NEW
GRINDER
HAND**



how to get maximum service from your Diamond Tools — we have some effective training material. Send for it. No obligation.

KOEBEL DIAMOND TOOL CO.
9346 Grinnell Ave., Detroit

**KOEBELITE
DIAMOND TOOLS**

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for All Industrial Purposes.



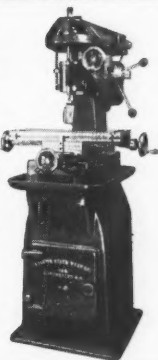
**Vertical Mill
and Jig Borer**

A simplified, precision tool for milling, boring, facing and routing small parts for instruments, arms and munitions in tool, die and machine shops.

Spindle dia. at driving end, $\frac{1}{2}$ " 1150 and 1750 r.p.m., 5 speeds. 12" longitudinal travel of table, 7" cross travel. 4" spindle feed.

Write for folder.

A G & S Representative in all principal cities.



Granite State Machine Co., Inc.

MANCHESTER

NEW HAMPSHIRE

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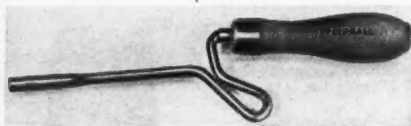
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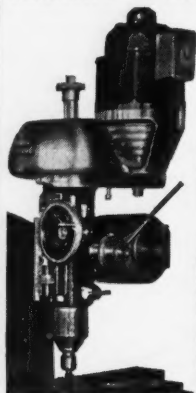
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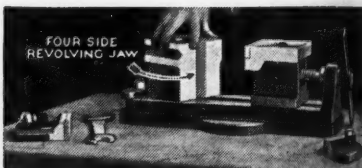
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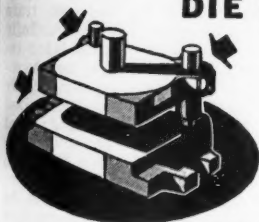


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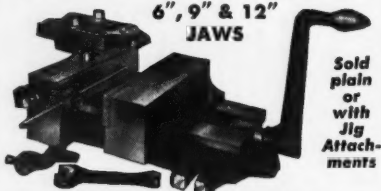
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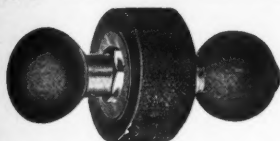
New Books

Breaking the Skilled Labor Bottleneck
By Eugene J. Bengé. Published by the National Foremen's Institute, Inc., Deep River, Conn. 47 pages, 6 x 10 inches, 20 charts and tables. Tan buckram binding. Price, \$2.50.

Designed especially for use by foremen, supervisors, and instructors, this book explains how to maintain peak production; what steps to take to train "green" hands in half the time usually required; how to utilize present labor resources to greatest advantage; how to divide and allocate work to spare highly trained men for their own specialized skills; what to do about upgrading; what training principles to follow; how to assure speed plus accuracy; how to obtain more satisfactory results in supervision; practical psychological attitudes to be followed by foremen, supervisors, and plant heads; and many other plans, case histories, suggestions, and tested ideas for solving the problems of skilled labor shortage. The text is based on the author's many years of experience in all phases of shop practice and with workers and plant executives of all types.

Dunwoody Welding Training Manuals. The American Technical Society, Drexel Ave. at 58th St., Chicago, Ill., is now publishing a series of two manuals for use in the training of operators for arc and gas welding. The plan of training and training material provided in the manuals

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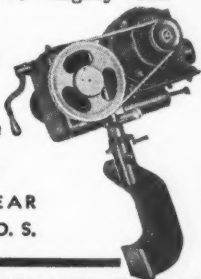
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have been developed and tested by the staff of the Metal Trades Department of the William Hood Dunwoody Industrial Institute and other cooperating schools and agencies.

The manual on arc welding training includes material on 40 jobs with an information sheet and a sheet of checkup questions on the first 32 jobs. A job information sheet is furnished for the last eight jobs. The manual contains a total of 103 pages, numerous illustrations, and a page of fundamental welding symbols.

The gas welding training manual includes material on 40 jobs with a job information sheet and a checkup question sheet for the first 28 jobs. A job information sheet is furnished for the last 12 jobs. This manual includes a total of 92 pages, numerous illustrations, and a page of fundamental welding symbols. Both manuals are Wire-O bound so that pages lie flat when manuals are opened, and are available at a price of \$1.25 per copy.

Diesel Vehicles, Operation, Maintenance and Repair. By F. J. Camm. Published by the Chemical Publishing Co.,

Inc., 234 King St., Brooklyn, N. Y. 10 pages. Cloth binding, board covers. Price, \$2.00.

Designed to meet the need for a book which deals with the operation and particularly with the maintenance and repair of Diesel vehicles, this book is divided into 13 chapters as follows: (1) The Practical Aspects of Design, (2) Diagnosing Injection Troubles, (3) Maintenance of the Injectors, (4) Fuel-Injection Pump Maintenance, (5) The Fuel Supply System, (6) Centrifugal and Pneumatic Governors, (7) Decarbonizing, (8) Reconditioning the Valve Gear, (9) The Piston Rings and Cylinders, (10) Connecting Rod and Main Bearings, (11) Engine Auxiliaries, (12) Modern Fuel-Oil Engines, (13) The Invention of the Diesel Engine. Numerous illustrations are included in the book to amplify the text.

Practical Mechanics Handbook. By F. J. Camm. Published by the Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y. 400 pages, 390 illustrations. Cloth binding, board covers. Price, \$4.00. In this book, the author endeavors to



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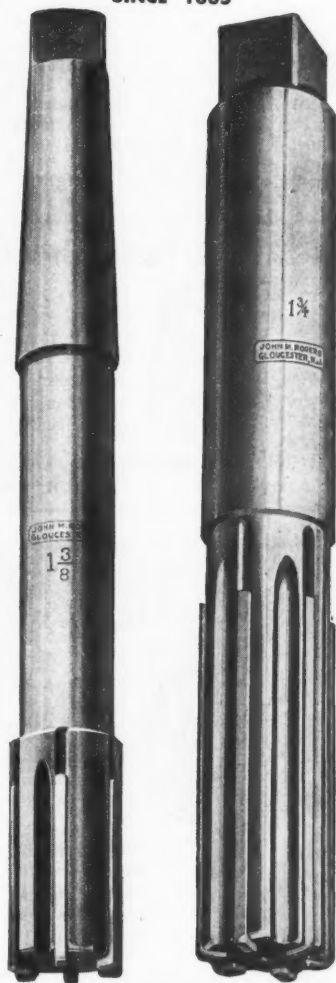
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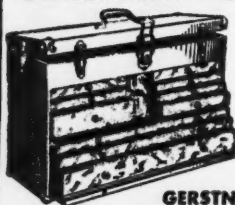
include matter and tables known from experience to be most required by men in the mechanical trades. The text covers the lathe, small tools, filing, fitting, and marking out, the dividing head, the micrometer and vernier, mensuration, screw cutting, gear cutting, hardening and tempering, case hardening, the chemical coloring of metals, electroplating, silver soldering, brazing, welding, soft soldering, the soldering of aluminum, methods for obtaining a patent, the metric system, patternmaking, battery charging, the sharpening of woodworkers' tools, the polishing and finishing of metal, mechanical drawing, blueprints, weights and

measures, glue, cements, and adhesives and so on. To enable readers to rapidly locate the information they desire, the book is provided with a fully cross-referenced index.

Blueprint Reading for the Metal Trades
By W. A. DeVette and D. E. Kellogg
Published by The Bruce Publishing Co.
540 N. Milwaukee St., Milwaukee, Wis.
132 pages. Cloth binding, board covers.
Price, \$2.50.

This book, as the name implies, is designed to provide mechanics with means for reading or interpreting industrial drawings supplied to them in the form of prints of various color combinations. Clearly written and illustrated throughout, the book is divided into 14 chapters as follows: (1) The Blueprinting Process, (2) Working Drawings, (3) Sketching, (4) Reading a Drawing, (5) Invisible Edges, (6) Oblique Surfaces, (7) Cylindrical Objects, (8) Sectional Views, (9) Screw Threads, (10) Reading Dimensions, (11) Assembly Drawings, (12) Finish and Finish Marks, (13) Limits, Tolerances, and Allowances, (14) Gearing, (15) Miscellaneous Reading Problems.

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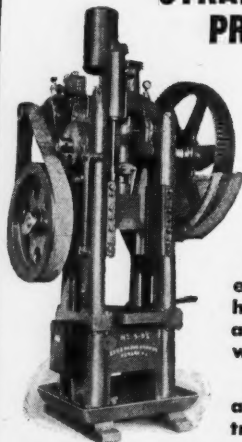
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Dunwoody Series Machine Shop Training Manuals. American Technical Society, 58th at Drexel Ave., Chicago, Ill., is now publishing a series of six Wm.-O. bound manuals containing material for training workers on lathe, drill press, milling machine, grinder, shaper and planer, and bench work. Developed and tested over many years by the staff of the Metal Trades Department of the William Hood Dunwoody Institute, the plan of training and training material provided in the manuals are said to be successfully used for the pre-employment training of novices, the refresher training of unemployed persons with previous ma-



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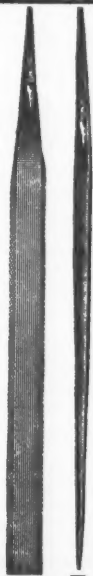
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An instructor's guide covering in detail the use of the manuals is also being published by the American Technical Society. This guide also covers the organization and devices for efficient shop control in using the manuals and efficient methods of teaching it.

AL Revised Handbook of Special Steels. A revised edition of its AL Handbook of Special Steels which incorporates all pertinent information on various grades of stainless, tool, and other special alloy steels is announced by the Allegheny Ludlum Steel Corp., Pittsburgh, Pa. Particularly adapted for use by design engineers and production men, the handbook includes complete data for guidance in the proper selection, treatment, and use of these alloy steels, together with finder charts and numerous tables to facilitate quick reference.

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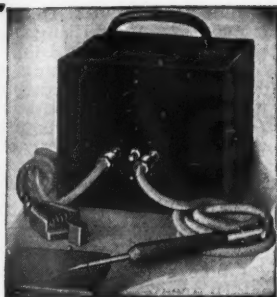
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Simply written and well illustrated with diagrams and photographs, the booklet translates basic engineering principles of functional lift truck construction into terms readily grasped even by those completely unfamiliar with this type of materials handling equipment. The booklet is divided into six sections

as follows: Section 1, Design; 2, Frame Construction; 3, Lifting and Stacking Mechanism; 4, Power Plant and Travel Mechanism; 5, Operating and Control Mechanism, and 6, Servicing and Maintenance Features. To further facilitate reference, each section is printed in a different color scheme. Copy of booklet will be sent free of charge upon receipt of a request addressed on a company letterhead.

"Tremendous Trifles," a 24-page guidebook to greater war production, has been prepared by the Mullins Mfg. Corp., Salem, Ohio. This brochure is designed to graphically show captains of industry and engineers how, by the application of technical skill, they can conserve irreplaceable metals and bring about improvements in producing the particular parts or products they have contracted to supply to Ordnance. Copy free upon request.

Wheelabrator Operator's Manual. A comprehensive, illustrated manual on the care and operation of Wheelabrator airless abrasive blast cleaning equipment has been published by the American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind. The instructions and suggestions contained in the manual, all of which are based upon practical operating experience, are said to enable the Wheelabrator operator to keep his blast cleaning equipment in the best possible mechanical condition and to obtain maximum performance.

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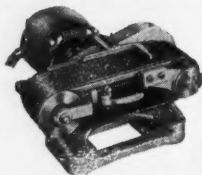


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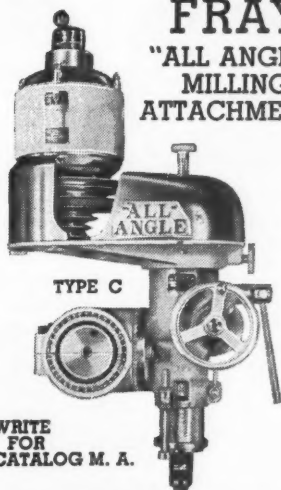


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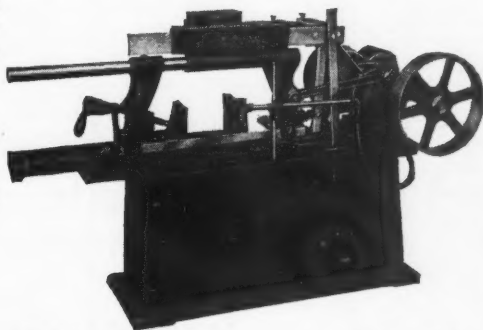
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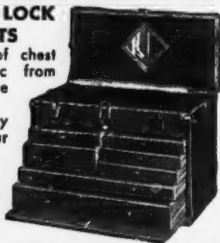
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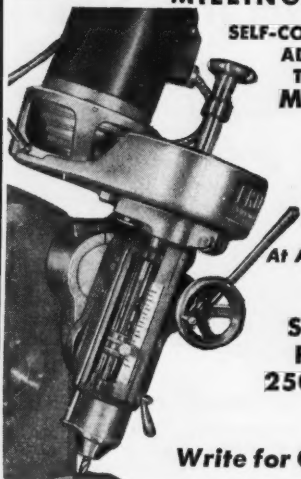
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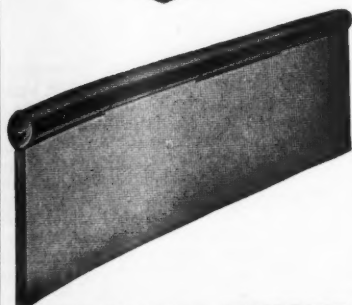
"How to Use Internal Grinding Diamond Wheels for Cartridge Dies" is the subject of a four-page informative folder announced by J. K. Smit & Sons, Inc., 137 Chambers St., New York, N. Y. Copy free upon request.

South Bend Turret Lathe Bulletin 1004. Released by the South Bend Lathe Works, Dept. 4Z, South Bend, Ind., this four-page bulletin fully describes and illustrates South Bend Nos. 1003-C and 1004-C Bench Model Turret Lathes. Conveniently tabulated specifications list all necessary information concerning capacities, feeds, speeds, and dimensions. Copy of Bulletin 1004 free upon request.

Revised Manual on Oakite Compound No. 32. A revised and enlarged fourth edition of its manual on Oakite Compound No. 32 is now being issued by Oakite Products, Inc., 57 Thames St., New York, N. Y. Of particular interest to works managers, plant superintendents, master mechanics, foremen, and so on, this 24-page manual concisely reviews safe, economical methods for effectively and speedily removing lime-scale, rust, and similar deposits from many different types of water-cooled or water-circulating equipment, including blast furnace cooling coils, metal washing machines, lead oxide mixers, spot welding machines, cutting and quenching oil cooling coils, Diesel engine water jackets and radiators, lube oil and jacket-water coolers, refrigerant condensers and compressors, surface condensers, feedwater heaters, and other heat exchangers. In this connection, considerable data is given on how Oakite Compound No. 32, a specially designed scale-dissolving material, not only eliminates the hazards to personnel and equipment so frequently involved with the use of commercial raw acids, but also eliminates the need for tedious, time-consuming mechanical methods on a wide range of scale and rust removal work.

Another interesting feature of the manual, particularly from the production angle, is the information presented on removing mill scale and other scale deposits from heat treated, hardened, annealed, or welded parts or surfaces before subsequent finishing operations, and also on removing rust from parts between manufacturing or assembly operations and from exterior surfaces of machinery or equipment for maintenance purposes. Copy of manual free upon request.

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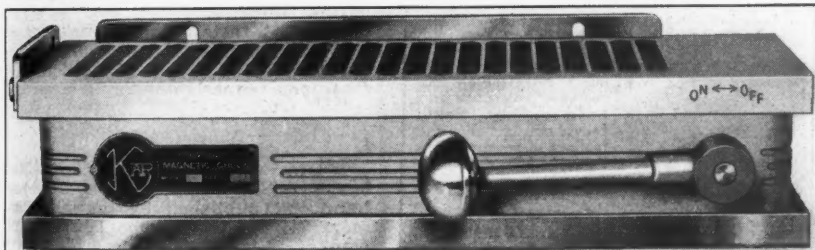
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MASSACHUSETTS

Magnolia Bearing Metals. An eight-page illustrated bulletin on bearing metals has been published by the Magnolia Metal Co., 18 W. Jersey St., Elizabeth, N. J. The bulletin describes various lead-base metals which have been found exceptionally long wearing on shock loads, under heavy sustained pressures, and so on, and which are said to prove excellent substitutes for tin-base bearing metals.

Two useful features of the bulletin are a number of practical suggestions for best results in making and maintaining journal bearings, and a table of recommendations for selecting the correct type of

bearing metal for 135 different types of machinery. In addition, the bulletin describes Isotropic Bronze Bearings, die-cast by a crystal control method. Copy free upon request.

"Your Own Inspection Laboratory." Designed to assist war production plants both large and small, in the selection of equipment for the establishment of an inspection department, an eight-page booklet entitled "Your Own Inspection Laboratory" is now being distributed by the George Scherr Co., 130 Lafayette St., New York, N. Y. The booklet covers briefly the use of gage blocks, comparators, projectors, and other inspection department essentials. Copy free upon request.



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Hygrade Sylvania Fluorescent Lighting Fixtures is the subject of a 30-page catalog now being offered by Sylvania Electric Products Inc., Ipswich, Mass. The catalog is designed to simplify the problem of selecting the proper types and quantities of fixtures for a particular lighting project. Besides illustrating and describing over 30 models of lighting fixtures, the catalog contains a list of recommended minimum standards of illumination, information on how to plan a fluorescent installation, pictures of actual applications, and general engineering and maintenance information. Copy free upon request.

"Plain Facts on Wartime Care of Rubber V-Belts" is the title of a 16-page handbook published by the Allis-Chalmers Mfg. Co., Texrope Division, Milwaukee, Wis. The handbook begins with a description of the anatomy of a V-belt and principle of the V-belt drive and ends

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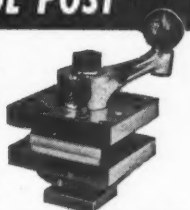


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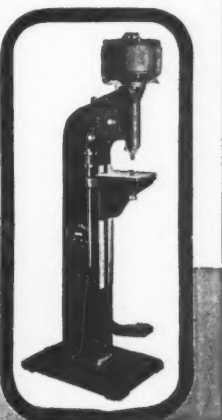
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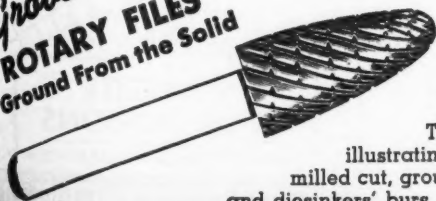
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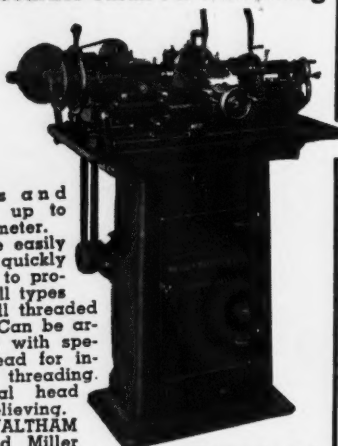
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with post-mortems on actual damaged V-belts. The text explains how the anatomy of a V-belt affects its maintenance, how to obtain proper V-belt tension, what to do about worn sheaves, what determines the life-expectancy of V-belts, and so on. Copies of the handbook, the data of which applies to all makes of V-belts, can be obtained free upon request.

Westinghouse A. C. Welders for use with the Unionmelt process are illustrated and described in an eight-page booklet announced by the Westinghouse Electric & Mfg. Co., Dept. 7-N-20, East Pittsburgh, Pa. Copy of Booklet B-3090 free upon request.

"How to Increase Tool Life" is the title of a 24-page informative booklet now being distributed by the Norton Company, Worcester, Mass. The booklet illustrates and describes methods for properly grinding metal-cutting tools so as to obtain high quality work finishes and, at the same time, eliminate frequent tool resharpening, thus providing for long life. Copy free upon request.

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Write for new Bulletin No. M.

WALTHAM MACHINE WORKS
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"Welding's Greatest Advance" is the title of a 36-page bulletin prepared by Eutectic Welding Alloys, Inc., 40 Worth St., New York, N. Y., regarding the Castolin Eutectic Low Temperature Welding Process. Devoted entirely to information concerning the production or salvaging of machinery and tools, the bulletin is written in such a manner as to be of practical value to readers as well as a guide to welding problems of all kinds. Numerous illustrations show the practical applications for the various Castolin Eutectic Alloys. Copy free upon request.

Mid-West Micro Bond Abrasives. A four-page folder citing the advantages of uniformity of hardness and grain structure in honing and superfinishing stones has been published by the Mid-West Abrasive Co., 1960 E. Milwaukee Ave., Detroit, Mich. Printed in gold and blue and handsomely illustrated, the folder features the company's well-known Micro Bond honing and superfinishing stones. The back cover contains a chart to be used as a guide in the selection of the proper stones intended for use on steel of known hardness. Copy of folder free upon request.

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South Bend Lathe Catalog No. 100-B.

A 48-page catalog covering its entire line of engine, toolroom, and turret lathes has been published by the South Bend Lathe Works, Dept 42, South Bend, Ind. Each size and type of lathe is illustrated and fully described, and specifications are tabulated to facilitate the selection of the lathe required for any desired application. Attachments, tools, and accessories for adapting the lathes to special classes of work are also illustrated and described. Copy of Catalog No. 100-B free upon request.

unveiling the mysteries of wheel selection and wheel markings. One section, devoted to honing and superfinishing stones, contains instructive charts on honing and superfinishing stone recommendations. Copy of booklet free upon request.

Ward Leonard Vitrohm and Ribohm Field Rheostats are the subject of a 16-page bulletin prepared by the Ward Leonard Electric Co., Mount Vernon, N. Y. Copy of Bulletin 60A free upon request.

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"Grinding Wheels — Their Construction and Selection"

is the title of a 26-page illustrated booklet published by the Mid-West Abrasive Co., 1960 E. Milwaukee Ave., Detroit, Mich. The booklet, which is printed on heavy enameled paper, contains 22 half-tone photographs of various types of Mid-West grinding wheels, honing and superfinishing stones, and 20 sectional diagrams of the same.

Primarily educational in character, the booklet presents a comprehensive picture of how grinding wheels and other solid abrasives are made and what they are made of, as well as a number of highly interesting tables and charts detailing grain and grade specifications, recommended grinding wheels speeds, minimum spindle diameters and wheel weights, and some functional facts of grinding wheel operation. Also included are two tables

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Ohio Planers. The Ohio Machine Tool Co., Kenton, Ohio, is now issuing a 12-page bulletin which includes illustrations, descriptions, and specifications of its various sizes and types of planers. Copy of Bulletin No. 500 free upon request.

"For Grinder Men Only—Ladies Night" is the intriguing title of an instruction booklet on dressing and truing grinding wheels which is now being offered by the Koebel Diamond Tool Co., 9346 Grinnell

Ave., Detroit, Mich. Especially designed for use by women, the booklet, utilizing a combination of cartoons and short, punchy captions, clearly and simply points out and explains how a wheel should be dressed, the need for care in the handling of diamond tools, the importance of taking light cuts, the use of a "drag" angle, correct speed, and other factors bearing on the economical and efficient utilization of diamond tools and grinding wheels. Copy free upon request.

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R-S Butterfly Valve Catalog No. 15-B
 A four-page catalog on 150, 300, and 600-lb. cast steel valves having sufficient face-to-face dimensions to permit the mounting of ball bearings for high pressure service is now being issued by R-S Products Corp., Wayne Junction, Pa. The principal features and applications and general operating characteristics of the valves are discussed. Also included in the catalog are complete tables of dimensions. Copy of Catalog No. 15-B free upon request.

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 Both Spindles
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"Keep Your Lathe Clean" is the title of a 16-page bulletin released by the South Bend Lathe Works, Dept. 42, South Bend, Ind. The bulletin, the first of a series on the subject "How to Get the Most Out of Your Lathes," shows how keeping lathes clean will help increase production, reduce scrap, and lengthen the life of a lathe. Its 19 illustrations supplement the clearly written text to fully portray the best method of cleaning the various lathe units. The importance of periodical cleaning of all machine tools is explained by pointing out the damage that can be caused by accumulated dirt and chips. Copy of Bulletin H-1 free upon request.

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Acromark Stamping, Marking and Numbering Equipment Brochure. An eight-page brochure illustrating and describing more than 65 modern marking tools and machines for ordnance and industrial marking is now being issued by The Acromark Corp., 9 Morrell St., Elizabeth, N. J. Machines for difficult cold stamping of steel and alloy steel, hot stamping of metals and other materials, marking plain and insulated wire, war parts marking and piece numbering are among those treated in the brochure, copy of which can be obtained free upon request.

V-blocks, and various other tools and equipment. Copy of Catalog No. 42 free upon request.

"Soldiers of Production" is the title of an unusually interesting catalog now being distributed by the Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y., telling by means of pictures and words the part which the alloy metals produced in the Niagara Falls plant of this concern are playing in the war effort. Copy free to mechanical executives upon request.

Acme Precision Production Tools are the subject of a 64-page catalog prepared by the Acme Tool Co., 202 Church St., New York, N. Y. The catalog includes illustrated and descriptive information on air guns, magnetic angle irons, Meehanite and cast iron angle plates, bench plates, bench vises, boring bars, boring heads, boring tools, box parallels, Clinometers, special cutting tools, demagnetizers, dust collectors, electric etchers, files, hose fittings, flexible shaft machines, flexible shaft handpieces, gage blocks, goggles, independent and universal lathe chucks, live centers, magnetic blocks, magnetic chucks, milling machine vises, multi-purpose tools, Meehanite and cast iron surface plates, profiling machines, recessing tools, rectifiers, rotary tables, Meehanite straight edges, threading tools, tool bits, toolholders,

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Cincinnati Hypro Double Housing and Open Side Planers, Planer Type Millers and Vertical Boring Mills are described and illustrated in a 32-page general catalog published by The Cincinnati Planer Co., Cincinnati, Ohio. Copy free upon request.

Rex Rheostat Catalog R. A 12-page catalog containing illustrations, descriptions, and tables on the various rheostats and resistors marketed by the Rex Rheostat Co., Baldwin, Long Island, N. Y., is now being issued by this firm. Copy free upon request.

Studebaker Hydraulic Drillvise. A four-page bulletin illustrating and describing the Studebaker Hydraulic Drillvise, a foot-controlled vise designed for holding work on drill presses, milling machines, surface grinders, shapers, boring machines, cut-off saws, and many other machines, is now being distributed by the Studebaker Machine Co., 9 S. Clinton St., Chicago, Ill. Copy free upon request.

Aircraft Engine Trouble Shooting Chart. Arranged by Andrew Wallace, M. M., Crew Chief, Eastern Air Lines, Inc. Published by the Norman W. Henley Publishing Co., 17-19 W. 45th St., New York, N. Y. Size, 22 x 32 inches. Price, 75 cents.

This reference chart, based on the results of years of practical experience, is arranged so that any ordinary person can easily trace and learn the proper way to correct aircraft engine troubles. Troubles are quickly diagnosed through the medium of a sound section on the chart, which, in turn, identifies the troubles in smaller sections arranged around the sound section and connected with the section by means of guide lines, thus enabling a person to quickly employ the proper procedure for correcting his particular engine trouble.

The chart explains how to remedy through the medium of sound the following defects in aircraft engine operation: irregular valve action, poor mixture, vibrating action, poor compression, valve mistiming, backfiring and propeller action. The chart is said to be especially useful for aircraft engine mechanics, airports, schools, and all fields of the Army and Navy air forces.

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Bath Metal Forming Die and Special Machinery. The Cyril Bath Co., E. 70th and Machinery Ave., Cleveland, Ohio, has published an interesting catalog containing information regarding the various types of metal forming dies in use and modern manufacturing methods with bending presses. Copy of this 36-page profusely illustrated catalog free upon request.

tary and Drum Type, Planetary Milling Machines, Die Sinking and Profiling Machines, Milling Machine Attachments. Copy free upon request.

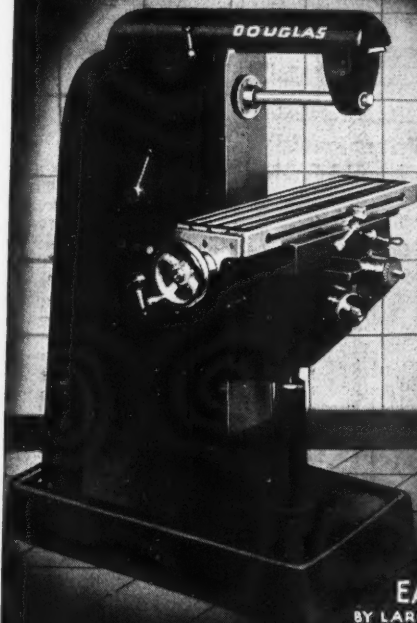
"For the Prevention of Dermatitis" is the title of an eight-page bulletin now being distributed by the Standard Safety Equipment Co., 232 W. Ontario St., Chicago, Ill. The bulletin illustrates and describes garments of Sta Safe Fabric, including jumper suits, various types of aprons, coats, pants, chaps or hip leg-

"Milling Machine Practice." The Cincinnati Milling Machine Co., Cincinnati, Ohio, is now issuing an improved edition of its booklet "Milling Machine Practice." The booklet, which is designated as the No. M-773-1, is divided into four chapters as follows: Chapter I, Analysis of the Process of Milling (Fundamental Concept, Characteristic Form of Milling Chip, Surface Generated in Milling, Chip Formation); Chapter II, Milling Cutters (Classification Based on Relief of Teeth, Classification Based on Method of Mounting, Direction of Rotation, General Types of Cutters, Material for Milling Cutters, Number of Teeth); Chapter III, Use of Milling Cutters (Cutting Speed, Feed Rate, Diameter of Cutter, Clearance Angle (Relief), Rake Angle, Cutting Fluid, Comparison of Up-Milling and Down-Milling, Power Required for Milling, Typical Milling Jobs, Speeds, Feeds); Chapter IV, Milling Machines (Knee and Column Type, Hand Millers, Fixed Bed Type, Ro-

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gings, and so on, and Economy Skin Shield, a protective coating for hands for prevention of dermatitis. Copy free upon request.

Formax Bulletins. A series of three bulletins covering various types of Formax (4-Max) compounds for buffing, burring, polishing, and lapping, Formax Soft Rubber Polishing Wheels, and Formax Polishing and Buffing Wheels of wire, muslin, felt, Tampico, and so on, is now being distributed by the Formax Mfg. Co., 3999

18th St., Detroit, Mich. The company has also prepared a folder covering 4-Max combination 4-in-1 rubbing compound. Copies of folder and bulletins free.

Unichrome Alkaline Copper Process
A six-page bulletin describing the Unichrome Alkaline Copper Plating Process for the improved selective hardening and deep drawing of steel is announced by United Chromium, Inc., 51 E. 42nd St., New York, N. Y. The bulletin also describes the Unichrome Alkaline Stripping Bath for use in removing copper from steel. Copy of Bulletin No. 54 free upon request.

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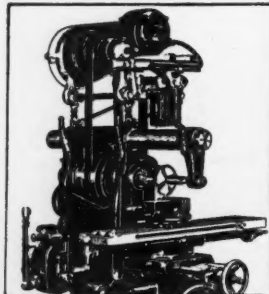
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Bear Dy-Namic Balancing Machines for balancing armatures, fans, wheels, gears, and so on, are described and illustrated in a booklet published by the Bear Mfg. Co., Industrial Division, Rock Island, Ill. The booklet also contains concise data on dynamic balancing and its importance in eliminating noise and premature wear due to excessive vibrations resulting from couple action. Copy free to production and maintenance men, design engineers, and other interested executives upon request.

Bliss, Toledo and Consolidated Inclinable Presses. The E. W. Bliss Co., 530 St. and 2nd Ave., Brooklyn, N. Y., is now issuing a 36-page catalog which profusely illustrates and describes the company's line of Bliss, Toledo, and Consolidated inclinable presses. Complete dimensions and specifications for the various type presses are presented in convenient tabular form. Copy of Catalog No. 2 will be sent free of charge to any mechanical executive addressing a request on his company letterhead.

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Enco Tailstock Turret for bench, engine, and turret lathes and screw machines is the subject of a bulletin now being distributed by Victor Machinery Exchange, Inc., 251 Center St., New York, N. Y. Copy free upon request.

Cooley Electric Furnaces for industrial and laboratory uses are covered in a four-page illustrated bulletin released by the Cooley Electric Mfg. Corp., Indianapolis, Ind. Copy of Bulletin No. 50 free upon request.

Trabon Electric-Hydraulic Barrel Pump for pumping oil, light, medium, or heavy greases from original containers is covered in detail in a four-page bulletin issued by the Trabon Engineering Corp., 1814 E. 40th St., Cleveland, Ohio. Copy of Engineering Bulletin No. 425 free upon request.

Stronghold Screw Products. Manufacturers Screw Products, 216 W. Hubbard St., Chicago, Ill., has published a 100-page catalog and price list of its line of

Allis - Chalmers Health and Safety Manual. The Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces the publication of a health and safety manual devoted exclusively to the problems of women in industry. Written and styled with the woman's point of view in mind, the text includes attractive line drawings and photographs of women's activities in the plant. One unusual feature is a section devoted to the proper attire for women in the shop. This section deals particularly with the new safety clothing designed by the health and safety division of the Allis-Chalmers industrial relations department. In addition, the manual also treats the proper exercises necessary for the maintenance of good physical condition. Other sections discuss hazards to be avoided in various occupations. Copy of manual free upon request.

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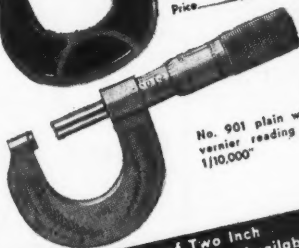
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Hygrade Sylvania Fluorescent Fixtures with Slide-Grip Hangers for continuous-row industrial lighting are described and illustrated in a six-page folder announced by Sylvania Electric Products Inc., Ipswich, Mass. Copy free upon request.

"Tap Talk," No. 1 of a series of circulars on taps and tapping to be distributed by Greenfield Die & Tap Corp., Greenfield, Mass., is now available from this firm free upon request. The circular explains what the various parts of a tap are called, discusses screw thread terms, and includes information on thread designations and thread forms. Subsequent circulars in the series will

be headed "Grinding Taps," "How to Order Special Taps," "Tapping Lubricants," and so on, and will be introduced at four to six week intervals.

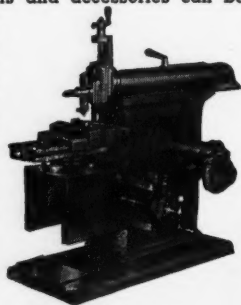
Gorton Munitions Engraver and "Spitfire" Electric Arc Etcher. Bulletin 1633-A containing illustrated, descriptive, and tabular information on the Gorton Munitions Engraver and "Spitfire" Electric Arc Etcher is now being distributed by the George Gorton Machine Co., Racine, Wis. Copy of this eight-page bulletin free upon request.

"Rubber Conservation for Users of Industrial Rubber Belting," an eight-page bulletin published by The B. F. Goodrich Co., Akron, Ohio, contains as one of its principal features an illustrated step-by-step procedure for making repairs on conveyor belts by the use of portable electric vulcanizers. "How You Can Save Rubber in Your Plant" is the general theme on the bulletin, which is divided into interesting subheadings entitled "Rubber Can Be Saved by Making Vulcanized Repairs Promptly," "Rubber Can Be Saved by Salvaging Belts

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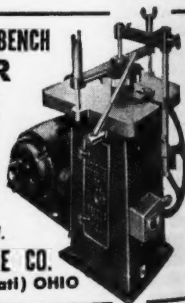
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for Smaller Drives," "Rubber Can Be Saved by the Plylock Splice," and "Rubber Can Be Saved by Proper Care." Interesting examples of rubber savings, already made are included in the bulletin, copy of which is available free upon request.

Industrial Plant Distribution System.

The design, operation, and characteristics of the various types of industrial distribution systems are described in a 24-page booklet announced by the Westinghouse Electric & Mfg. Co. Plant distribution systems

are described, advantages of each are stated, and cost, flexibility, reliability, regulation, and efficiency are discussed. A full page schematic diagram of each system is included.

On Page 2 of the booklet is a diagram of the conventional radial distribution system and on Page 3, a discussion of the system characteristics. On Page 4 is the simple radial system and on Page 5 is a discussion of its characteristics. Presented in the same manner are the loop primary radial, the banked secondary radial, the primary selective radial, the secondary selective radial, the simple network, the primary selective network, and the spot network systems.

Copy of Booklet B-3152 may be obtained from the Westinghouse Electric & Mfg. Co., Dept. 7-N-20, East Pittsburgh, Pennsylvania.

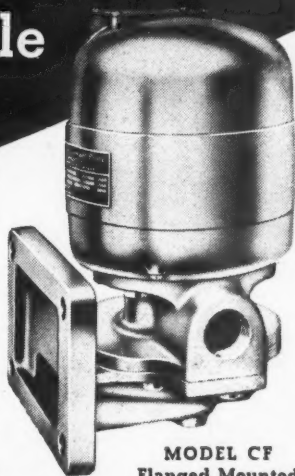
Hevi Duty Gas Cracking Unit, a unit designed to produce a protective atmosphere for use during the heat treatment of alloy and high carbon tool steels, particularly those containing molybdenum, is described and illustrated in Bulletin HD 1042 now available from the Hevi Duty Electric Co., Milwaukee, Wis., free upon request.

"Economical Vapor Degreasing," a catalog illustrating and describing its complete line of automatic degreasers for shells from 20 to 155 mm. is now

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available from the Phillips Mfg. Co., 3475 Touhy Ave., Northtown Sta., Chicago, Ill., free upon request.

"Wet-Dry Belt Surfacing" is the subject of a 20-page catalog prepared by the Porter-Cable Machine Co., 300-10 Wolf St., Syracuse, N. Y. The catalog goes into considerable detail on this subject and illustrates and describes various Porter-Cable Belt, Disc, and Spindle Surfacers, and so on. Copy free upon request.

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Hanna Squeeze Riveters. A 23-page illustrated catalog covering many of the 700 styles and sizes of riveters marketed by the Hanna Engineering Works, 170 Elston Ave., Chicago, Ill., is now being issued by this firm. Copy of Catalog 232 free to mechanical executives upon request.

Senacon Air Motors. Smith-Johnson Corp., 623 E. 12th St., Los Angeles, Cal., is now offering a four-page bulletin illustrating and describing the construction, uses, features, and so on, of Senacon Air Motors—small air-driven double-acting reciprocating power units for drill presses, milling machines, and other manually operated small machine tools. Copy free upon request.

Allis-Chalmers Centrifugal Pumps. Bulletin B6059-H covering a complete line of centrifugal pumps has been released by the Allis-Chalmers Mfg. Co., Milwaukee, Wis. The bulletin includes information on single and double suction, single and multi-stage, mixed and axial flow, and special pumps and pumps with Allis-Chalmers Lo-Maintenance Motors. Copy free upon request.

South Bend 13-Inch Lathe Catalog. Catalog No. 13 containing illustrated, descriptive, and tabular information on South Bend 13-Inch Precision Toolroom and Engine Lathes has been prepared by the South Bend Lathe Works, Dept. 4Z, South Bend, Ind. Attachments, accessories, and tools for use with the lathes are also listed in this eight-page catalog, copy of which can be obtained free upon request.



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THE V & O Press Co., INC.
HUDSON, N. Y.

"How to Use Truing and Dressing Tools for Better Grinding" is the subject of a helpful and interesting booklet prepared by the Norton Company, Worcester, Mass. Copy of this 20-page, profusely illustrated booklet free upon request.

Crucible Literature. Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y., is now issuing a series of folders containing information on Crucible Rexalloy Tipped Tools, Drill Rods, and Rex MM and MMM Molybdenum High Speed Steels. Copies free upon request.

"Silver Alloy Brazing of Fabricated Copper Piping," an article by J. C.

Allis-Chalmers Lo-Maintenance Motors. The Allis-Chalmers Mfg. Co., Milwaukee, Wis., has released a 12-page bulletin designed to provide all facts necessary for quickly choosing correct motors for war-time applications. The bulletin includes compact, simplified charts to enable the reader to determine at a glance all electrical and mechanical characteristics of the motor types designed for the specific application in which he is interested. For each design and application, relationship, rating, duty, torques, starting current, efficiency, and slip are indicated.

In addition, construction features of various Allis-Chalmers Lo-Maintenance Motors are completely described and numerous typical applications are illustrated. The bulletin also includes handy speed-torque curves as well as discussions of several engineering phases of motor application, such as the recommended use of higher speed motors and adjustable speed. Dimension ratings and price lists are likewise included. Copy of Bulletin B4063-C free upon request.

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Powers, Jr. and H. DeM. Lucas, sales engineers, Handy & Harman, 82 Fulton St., New York, N. Y., is the subject of an eight-page bulletin released by this firm. Copy free upon request.

Allis-Chalmers Texrope V-Belt Drives. Designed primarily to simplify the problem of selecting correct V-belt drives for war-time applications, a 12-page bulletin giving complete information on Allis-Chalmers Texrope V-Belt Drives is now being offered by the Allis-Chalmers

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Mfg. Co., Milwaukee, Wis. Copy of Bulletin B6051-C free upon request.

Henry & Wright Drilling Machine including single and multiple spindle types, are treated in a catalog available from The Henry & Wright Mfg. Co., Hartford, Conn., free upon request.

Hercules Solvents and Thinners. new 21-page booklet discussing properties and applications of a series of terpene solvents is being issued by the Naval Stores Department of Hercules Powder Company, Delaware Trust Bldg., Wilmington, Delaware.

The booklet emphasizes that while turpentine, which is composed of terpene hydrocarbons, has been used for many years as a solvent and thinner for protective coatings, it is but one of various terpene solvents available today. Thinners and solvents detailed in the booklet have been grouped under the classifications in accordance with their major constituents, as Bicyclic Terpene Hydrocarbons; Monocyclic Terpene Hydrocarbons; Terpene Alcohols; Terpene Ethers; and Terpene Ketones.

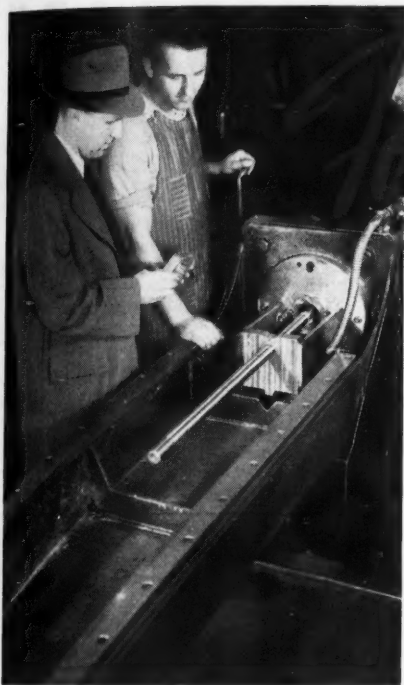
Included in the booklet are technical graphs on A.S.T.M. boiling ranges and distillation ranges and on the evaporation rates at 100 deg. C. of Hercules terpene solvents. Structural formulas are pictured, together with tables of typical analyses, citing specific gravity, refractive index, unpolymerized residue, flash points, Kauri-Butanol solvency value, aniline point, Ubbelohde viscosity and color.

In addition to the use of Hercules terpene solvents as single components of paint and varnish formulas, the company says, it is possible by proper selection among them to produce a wide variety of solvents which can be extended further or utilized for special purposes. Blending of terpene solvents by research chemists at the company's experiment station has yielded certain preliminary data on typical blends included in the booklet.

Solvency, volatility, flash point, odor, stability, drytime, flow, sagging, lifting and skinning are discussed generally. None of the solvent blends tested was found to cause discoloration of white alkyd enamels when air-dried or baked. The booklet reports.

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To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Diamond Tools

Christensen Diamond Tool Co., 3686 E. Willis, Detroit, Mich., has available new illustrated folder, "The Diamond World."

2. Planers

New bulletin No. 500, featuring Ohio Planers, has been issued by The Ohio Machine Tool Co., Kenton, Ohio.

3. Special Steels Handbook

A revised edition of "Handbook of Special Steels" which incorporates all pertinent information on the various grades of stainless, tool, and other special alloy steels, has been issued by Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

4. Rheostats

Rex Rheostat Co., Baldwin, L. I., N. Y., has available catalog detailing the line of Rex Rheostats.

5. Fluorescent Lighting Fixtures

A new fluorescent lighting fixture catalog is being offered by Sylvania Electric Products Inc., Ipswich, Mass.

6. Care of Rubber V-Belts

"Plain Facts on Wartime Care of Rubber V-Belts" is the title of new booklet published by and available from Allis-Chalmers Mfg. Co., Textrope Division, Milwaukee, Wis.

7. Flexible Shaft Machines

A new pocket-size Junior Catalog, No. 1-F, featuring Haskins Portable Flexible Shaft Machines, has been released by R. G. Haskins Co., 619 S. California Ave., Chicago, Ill.

8. Milling Machine Practice

A revised edition of "Milling Machine Practice" is now available from The Cincinnati Milling Machine Co., Cincinnati, Ohio.

9. Grinding Wheels

"Grinding Wheels — Their Construction and Selection" is the title of a new 26-page illustrated data booklet published by the Mid-West Abrasive Co., 1960 E. Milwaukee Ave., Detroit, Michigan.

10. Diamond Wheels

J. K. Smith & Sons, Inc., 157 Chambers St., New York, N. Y., has issued folder "How to use Diamond Wheels for internal grinding of Cartridge Dies."

11. Power Press Protection

A 16-page folder discussing Power Press Protection has been published by Junkin Safety Appliance Co., 800 West Hill, Louisville, Ky.

12. Turret Lathes

From South Bend Lathe Works, Dept. 4Z, South Bend, Ind., may be had new catalog 1004, featuring South Bend Turret Lathes with 10-in. swing.

13. Gage Blocks, Comparators

An 8-page booklet titled "Your Own Inspection Laboratory," briefly covering the use of gage blocks, comparators, projectors and other inspection department essentials, has been issued by George Scherr Co., 130 Lafayette St., New York, N. Y.

14. Electric Motors

A summary of recommendations on ways to get the most out of every motor is presented in booklet "Calling All Horsepower," available from Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

15. Universal Milling Head

The Halco Universal Head for high speed milling, drilling, boring and counterboring is detailed in folder available from Ajax Engineering and Mfg. Co., 14230 Birwood Ave., Detroit, Michigan.

16. Abrasive Cut-Off Machine

The Catskill Abrasive Cut-Off Machine is illustrated and described in folder issued by Catskill Metal Works, Inc., Catskill, N. Y.

17. Hand Miller

The Nichols Hand Milling Machine is illustrated and described in catalog available from W. H. Nichols & Sons, Waltham, Mass.

18. Turret Milling Machine

The Bridgeport Turret Milling Machine is illustrated and described in bulletin available from Bridgeport Machines, Inc., 52 Remer St., Bridgeport, Conn.

19. Gauges and Dial Indicators

Catalog No. 54 outlines the complete line of Ames Dial Indicators, Micro-meters, Gauges and Comparators. B. C. Ames Co., Waltham, Mass.

20. Bench Lathe

The Stark Precision Bench Lathe is illustrated and described in catalog available from Stark Tool Co., Waltham, Mass.

21. Gear Units

Bulletin No. SI-438 presents detailed description, tables of sizes and ratings and complete specifications of Farrel Type SI gear units. Farrel-Birmingham Co., Inc., 344 Vulcan St., Buffalo, N. Y.

22. Rotary Table

Folder issued by Machinery Manufacturing Co., Los Angeles, Calif., details the Vernon 7-in. Rotary Table.

23. Knurls

Catalog No. 61-1141, issued by Reed Small Tool Works, Worcester, Mass., details Reed Standard Stock Knurls.

24. Saw Sharpener

Howe & Son, Inc., Hinsdale, N. H., has available folder illustrating and describing the Howe-Lindsey Automatic Saw Sharpener for reconditioning hack, band, circular and slitting saws.

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Industrial Management Society Fifth Annual National Time and Motion Study Clinic

The Fifth Annual Clinic to be sponsored by The Industrial Management Society on the latest improvements and techniques in time and motion study applicable to obtaining greater war-time production will be held November 5th and 6th at the Medinah Club of Chicago, 505 N. Michigan Ave., Chicago, Ill. This conference has been designed for management and supervisors, as well as time-study engineers and rate setters.

The program includes discussions of basic methods, the training of time-study men, and the relations of time study to all-out production. The general theme will be "All Out for Production." Spe-



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431 MAIN ST. CINCINNATI, O.

cific topics of discussion will be "Time Standards of Accomplishment," "Motion Economy," "Waste Elimination," "Work Methods for Women," and "Fatigue and War Workers."

Lathe Wanted

Bicknell Mfg. Co., Rockland, Maine, is in the market for a heavy duty geared head single pulley drive lathe of 16 to 22 inch swing, 30 to 72 inches between centers, 4 or 6 speeds, with 2 walled box-type aprons. No compound rest or taper attachment necessary and no fine finish necessary.

ENLIST TODAY in the War Bond Drive. If you can't fight, your dollars can.

Women in Production Work

By WENDELL E. WHIPP*

WE in the machine tool industry in normal times have used very few women employees on machine production in our plants. Most of the work has been considered as being more suitable for the physiques of men than women, and with a plentiful supply of men available, we have until recently given little or no thought to employing women operators in our plants.

The present scarcity of men has brought many of us face to face with the necessity of employing women in our factories, just as has been done previously in Britain and Canada during this war. Many of us will remember the part women employees played in war production in America during the first World War, when the man power shortage did not begin to reach the acute stage it has already reached now. In all countries, women are now taking over more of the work ordinarily done by men.

We are all familiar with the very large percentage of women successfully performing all classes of machine and assembly operations in the gun, ammunition, aircraft and machine tool plants in Britain and later in Canada as well.

Today, especially in the great Western Aircraft Plants, and in most subcontractors' plants making parts for aircraft, women constitute at least one-fourth of the working force; and we learn that in many of these plants,

future personnel plans call for the employment of more women than men.

In many of our aircraft plants, women long since have been working alongside of men, without any distinction whatever as to occupation or as to rate of pay.

So, in employing women in the machine tool industry, I do not feel that we are venturing on an uncharted course.

Now let me tell you frankly about our experience in our own plant.

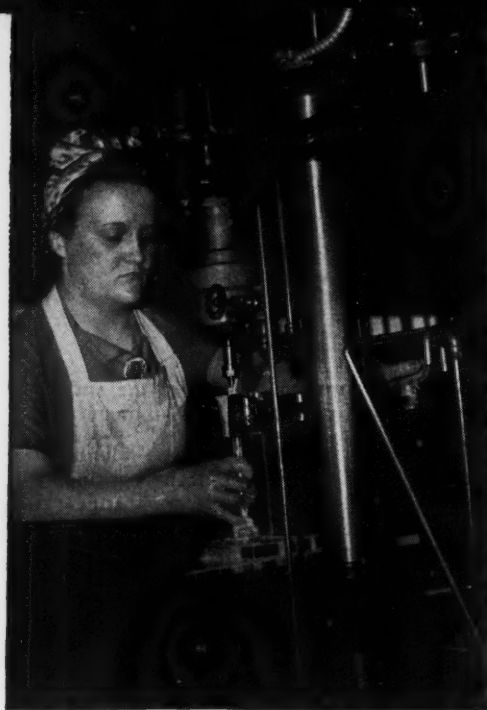
Like many of you, we had been thinking for a long time about the possibility of employing women, but we had not actually been doing anything about it.

Then on the 1st of March, this year, we went to 3-shift, 7-day operations and with that step, realized we had reached the practical limit of available man power in our area.

We felt that sooner or later we would have to employ women. But I doubt whether we would have done anything about it as soon as we did, had there been plenty of qualified men available.

Among the women making application for employment was one in particular who showed unusual promise. She was a mature woman, with a background embracing considerable busi-

*President of The Monarch Machine Tool Co.,
Sydney, Ohio



ness and legal experience. It occurred to us that we might well take her on, and use her as, you might say, as a laboratory experiment with the idea that if she proved out, she could then act in the capacity of "Supervisor of Women", or "Dean of Women", or whatever you might name that position, in case we later employed a large number of women in our plant.

So, early in May, we employed this woman, along with 2 others, and put all 3 in the production control department.

During June and July, we began to employ more women in production control and in stock checking. The men replaced by women were put on production jobs elsewhere in the factory, to replace men entering the armed services and to fill other shortages.

In the meantime, this particular woman whom we thought eventually might be the "Supervisor" in our shop

A year ago, Ed. Sundholm, President of Superior Mfg. Co., Albert City, Iowa, found he had more contracts for production than his crowded shop could handle. He converted his brand model dairy farm building into a machine factory and with women workers, is producing vital munitions for the U. S. Army. The illustrations are from O. W. I. photos by Ann Rosener.

literally tried out one job after another thruout our plant.

She went from department to department, trying out the jobs on a variety of machines. The purpose was, frankly, to find out whether a woman could perform these operations. She was successful in performing almost all of them. As a result of her personal experimentation on these different operations, we were convinced that in our plant, women could successfully undertake almost any of the jobs which had been performed by men.

This brought us up to the 1st of August. From that date on, women have been added to our factory force as rapidly as they could possibly be absorbed.

On our No. 1 shift, which is the day shift, we have 95 women in the machine division.

On our No. 2 shift, from 4 P. M. to midnight, there are 102.

As of today, out of a total factory force of 2,600, there are 300 women.

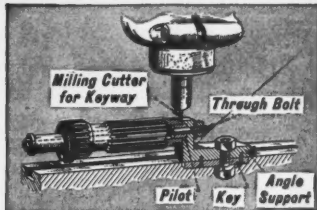
On our No. 3 shift, from midnight to 8 A. M. we have 103 women. These women are about equally divided between machine operation and assembly.

Generally speaking, the women in the older age brackets are assigned to the assembly division, and the younger women are used in the machine division, because of their capacity to learn the operations rapidly and their dexterity in handling machines.

I want to emphasize the fact that on all 3 shifts in our plant, women are used to operate all types of machines.

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MILLING ACCURATE KEYWAYS



DEVELOPS A QUICKER WAY TO DO THE JOB

A milling department leadman in a big aeronautical plant, William Van Way, has worked out this simpler, cheaper, entirely adequate Fixture for holding hollow impeller drive shafts. Sketch shows details. Only a few simple items are needed. An angle support has a tongue, fitting in the table slot. A bushing on the vertical leg centers the shaft, which is held by a long bolt through the shaft and bushing. The depth of the milling cutter is set by a thickness gauge from top of fixture. This effective device replaces the previous expensive set-up, reduces loading and unloading time to minimum.

TIME REDUCED 50%

USING A **GORTON**

SUPER-SPEED VERTICAL MILLING MACHINE

with a Simpler, Faster Set-Up

MILLING ACCURATE KEYWAYS on airplane engine impeller drive shafts is done on a Gorton 9-J Miller in half the former time (6.3 minutes per piece floor to floor), holding a tolerance of $\pm .001$ ".

The keyway is .188" wide x .440" long, having a .020" radius in the bottom corners. A two-flute end mill is run at 2800 r.p.m. This continuous high speed is made possible on the Gorton Super-Speed Vertical Miller because it has precision pre-loaded bearings, perfect balance, and rigid design. After each

fifty pieces, the cutter is re-sharpened on the Gorton 375-2 Cutter Grinder, which not only resharpsens the cutter flutes, but forms the .020" radius as well.

This is but one of many examples of how Gorton Super-Speed Millers and Gorton Cutter Grinders save vital hours of machining in aircraft and other plants producing war equipment. Perhaps our engineers can assist you in saving additional time on your high-speed milling. We will be glad to make recommendations — no obligation.

SUPER-SPEED MILLING DATA

OPERATION—Mill Key Slot .188" wide x .440" long, .020" radius in corners.

MACHINE—Gorton 9-J Super-Speed Vertical Miller.

PART—Gear Impeller Drive Shaft.

CUTTER—2-Flute, High-Speed Steel End Mill.

HOLDING—Simple Special Fixture as illustrated.

FEED—Hand.

SPINDLE SPEED—2800 r.p.m.

FLOOR-TO-FLOOR TIME—6.3 minutes.

FREE

Write for your copy of Bulletin 1400-B covering Gorton Super-Speed Vertical Milling Machines. It explains their 8 exclusive advantages for handling work faster and cheaper. Used for milling dies, molds, and miscellaneous or production work.



GEORGE **GORTON** MACHINE CO.

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1317 RACINE STREET, RACINE, WISCONSIN, U.S.A.

SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING

with the exception of planers, heavy turret chucking lathes, and other heavy work.

Women have proved themselves well able to handle all types of machining operations, and our only differentiation between men and women thus far has been entirely on the basis of degree of physical effort.

If in the future, if our supply of available man power should be even still more seriously curtailed, we would not hesitate for a moment to assign women to the operation of the heavier classes of machines. Of course, if we did so, we would have to provide them with adequate work lifting facilities, so as to reduce the amount of physical effort involved in their operation.

As new employees, women have shown themselves just as capable of learning how to operate machines as have the new men. In fact, with respect to some types of operations, they have shown themselves superior to

men. Let me give you a few illustrations:

We have found that women do particularly well in work requiring consistent care and alertness—in jobs where it is necessary to work to close tolerances, involving the use of gauges, micrometers, and other checking equipment, but calling for little physical exertion.

We have found, too, that women excel in work requiring manual dexterity and speed in repetitive movements. This is especially true in work which permits the operator to set her own tempo, and where she can work in a sitting position.

At the same time, we are not sure that whether a woman sits down or stands up at the job makes any great difference. We have found that most of the women in our plant prefer to stand up at a job at which they might just as well be able to sit down on a stool.



IT'S THE OFFENSE THAT WINS BATTLES

Since 1940, the Nazis have won battle after battle. Why? Because they've waged one offensive after another.

ALTER EGO: Yes, but they've been able to do that. They started their war production offensive 10 years ago so they had a big edge on us in tanks, planes and guns. Then we really started competing.

So competition forces progress. Look how in two years, our production offensive has already surpassed that of the Axis—turning out better weapons and more of 'em. These new arc welded M-4 tanks, for example. They'll soon be in our fighting offensive.

ALTER EGO: It's thrilling but don't let it get us complacent. Haven't we learned never again to be caught unprepared in war . . . or in business competition either?

There you have it! Let's start TODAY waging a planning and designing offensive so we'll be on the alert with better welded products and lower costs to get the upper hand on our competition the minute the post-war Battle for Business begins!

**Ask your inner self if it isn't
the offense that wins battles**

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

then I said to myself—

**IT'S A GREAT JOB
—WELD DONE!**



A few days ago one of our foremen noticed a woman, working at an assembly bench, standing on a small clean box. He asked her why. She said— "These new shoes are tight and they hurt my feet, so I took them off. I'm standing on this box to keep my feet clean and not lose any time." The foreman immediately gave her plenty of nice clean corrugated paper to stand on until she could find a more comfortable pair of shoes.

I just pass that incident on to you as evidence of the type of willingness to carry on that motivates so many of these women that we have just recently put to work.

I think these women realize pretty well that in working in our plant, they are helping to win the war. They are finding that a woman can help in this

war just as well as a man, and they are determined to do their part just as well as a man could do it.

Now, to go back once more to the point mentioned a moment ago—the woman are entirely capable of handling larger and heavier machines if adequate work handling facilities are provided. Let me give you an illustration.

The other day one of our superintendents noticed a woman on an assembly job where it was necessary for her to lift a weight approaching to the 25 pound limit prescribed by Ohio law. He asked the foreman to change her to a lighter assembly job. The woman said:

"I'll work any place you put me, but I don't want you to get the idea that this job is too heavy for a woman. It's no panty waist."

I cite this instance simply to show that as far as we can see, women are not asking for any discrimination or any special consideration because of their sex.

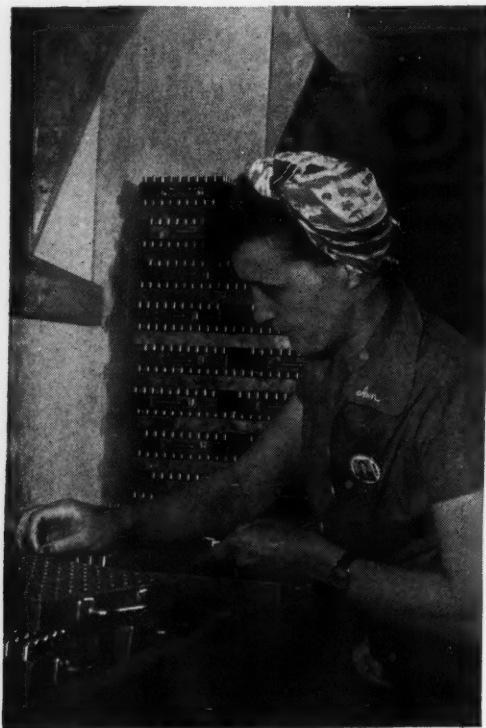
And that, of course, is one of the reasons why we have adopted our wage policy with respect to women.

Our starting rate for women is 5c less per hour than the starting rate for men, with an automatic 5c hourly rate increase at the expiration of a 30-day probationary period.

Woman employees who have been thru the 6 weeks' training course in the vocational department of our local schools start at the same wage as men.

In the operation of our own vestibule training school, women going thru the school and starting along with men in the same classes go into our plant on the same pay basis as men.

In short, while it is necessary for psychological reasons, under some circumstances, to start women at a rate slightly lower than that under which men are started, we are operating on the principle that women are entitled to equal pay with men for equal work



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WHEELS of PROGRESS

SYMBOL of VICTORY

Planes and more planes, machines and more machines and back of them goes our symbol of victory. We at BAY STATE are proud of our trade mark. To us it reflects the power of production embodied in abrasive products. To us it shows our part in the gigantic world-wide battle of production.

With greatly expanded kiln and oven capacity, new modern presses, increased personnel, BAY STATE offers greater production, quicker delivery and more accurate grade control of all types of resinoid and vitrified bonded abrasive products. Wheels of Progress indeed!

BAY STATE
ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.



done; and this, we are convinced, is the only fair basis of compensation.

You may be interested in the actual mechanics of putting women to work. Our new girls are usually put to work in pairs, side by side in the same department. Our Supervisor of Women introduces the girls to the foreman of the department, and paves the way for their acceptance in that department.

The girls feel that they can talk to our Superintendent of Women on any personal matters which have to do with the feminine side of the picture—but they are definitely under the foreman, and their foreman is the boss.

The question of work costume seems to be one which has bothered many companies who have considered employing women. In our shop, this worked out very naturally, without any difficulty whatever. The girls adopted, more or less as the standard costume, slacks, a sleeveless shirt, bandana handkerchief, and the machinist's apron. There were variations in colors and styles, and of course each girl likes to get her hair done in whatever way

she chooses, but on the whole, feminine costume in our plant conforms to the general type which is practical for the sort of work performed.

Back in the days of not so long ago we wondered what would be the effect on morale if we brought women into the shop.

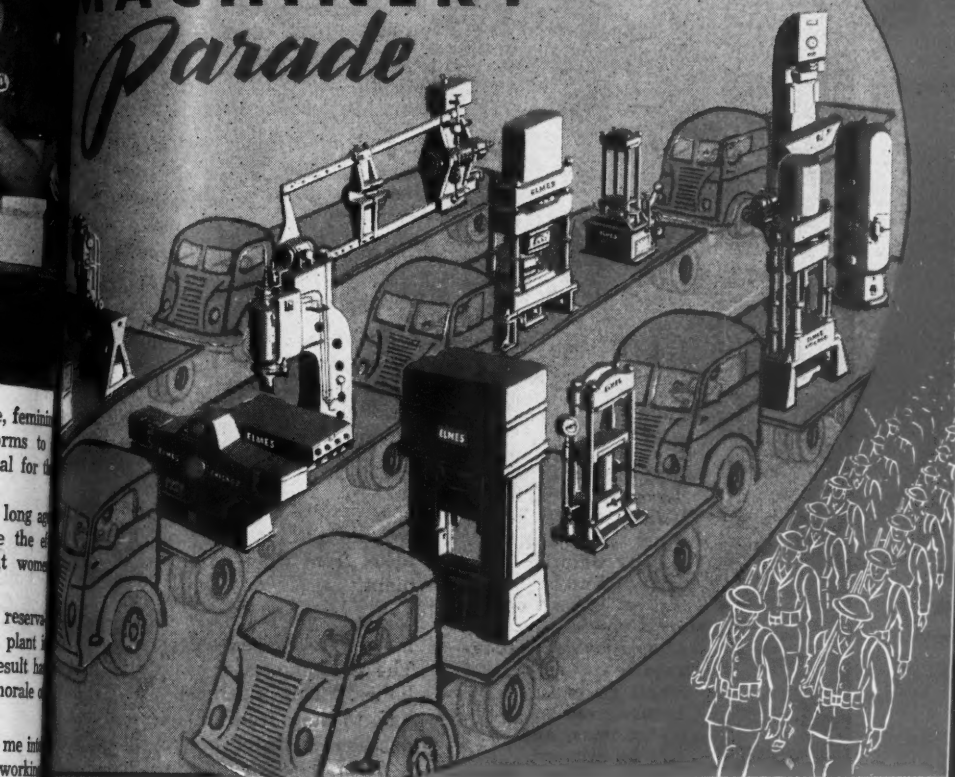
I can tell you without any reservations that so far as our own plant is concerned, I believe the net result has been that of stepping up the morale of the entire organization.

I wish you could go out with me into our plant and see the people working there, turning out the lathes that Uncle Sam has to have to win this war. They are all working side by side—handsome girls and women, strapping young men, older women, men of middle age—all plowing ahead—stepping together to get the job done.

There is a sort of comradery that develops from this mingling of the sexes in the plant which we never used to have when we had all men.

What develops from this situation is a realization that everybody not just

The HYDRAULIC MACHINERY *Parade*



This "parade" is representative of the broad line of Elmes Hydraulic machinery and equipment. Were it possible to load each typical Elmes-built unit on a truck, and assemble those trucks in a single line, such a parade would be several city blocks long. It would include metal working presses, plastic molding presses, extrusion presses, pumps, accumulators, valves and accessories . . . small units and large—suitable for all types of work—equipment for complete hydraulic installations. Write for a copy of the New Elmes Catalog.

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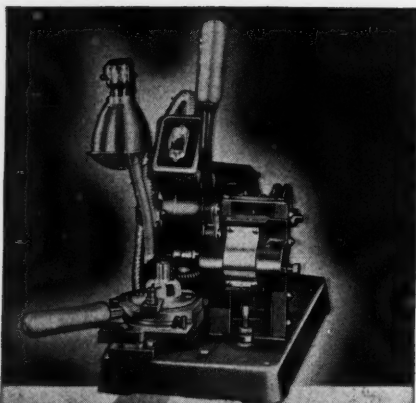
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NEW Low Cost Rouse HAND MILLER FOR SMALL PARTS



Here is a high-speed, ball bearing, motor driven miller for handling light cuts in brass, aluminum, and similar material.



The Rouse Hand Miller is adaptable, with special fixtures, to speedy and accurate production of small parts for aeroplanes, radios, electric motors, and similar equipment.



Spindle is adaptable to small circular milling cutters or small end mills.

Prompt delivery can be made. Mail coupon for information.

H. B. ROUSE & CO.
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Please send complete information on the New Rouse Hand Miller.

Name

Address

City

men, not husbands, sons and fathers but women too, sweethearts, wives and daughters — everybody — must get up and work, and work hard, to turn out what it takes to win this war.

I am convinced that all of us in the machine tool industry must of necessity prepare for the employment of women in rather large numbers before this war production emergency is over.

And on the basis of our experience I believe that those of you who have this transition before you, may be agreeably surprised.

I think you will find women far more attentive to their jobs than is the case with most men.

The girls take their jobs seriously. When you walk out thru the plant, you will see that the girls have their eyes on their work. They are not looking around the shop—they are not glibbling about this or that. They are frequently asking for suggestions as to how they can do their work better, and we are getting some mighty valuable ideas from some of the women in our plant.

For instance—to save floor space, our lathes are placed very close together. The work boxes are at the ends of the lathes. This meant that the operator had to step from the normal working position in front of the lathes to the ends of the lathes, in the course of the loading and unloading operations.

After one of our girls had been operating one of our lathes for several days she asked the foreman if she could please have a little stand on each side of her, so that she could operate the machine without taking a single unnecessary step. Here was an example of a woman applying in the plant, exactly the same work-saving principles which she had learned in her kitchen. Every woman learns how to save steps in the kitchen. A man might not think about it—but a woman thinks about

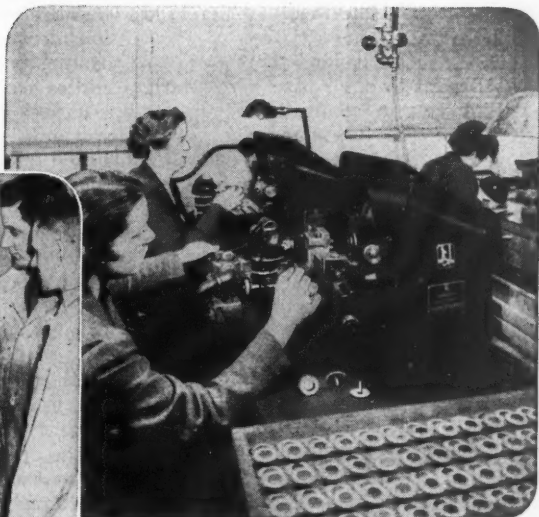
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Courtesy International Business Machines

Modern inspection by optical projection saves time and money

Jones & Lamson Comparators are available in Pedestal, Bench and other types to meet every need in the field of Inspection by Optical Projection. We shall be pleased to study your problems and apply to them the accumulated experience of more than twenty years in this field.

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Machine Tools

JONES & LAMSON MACHINE COMPANY

SPRINGFIELD, VERMONT, U. S. A.

Manufacturers of: Ram and Saddle Type Universal Turret Lathes - Fay Automatic Lathes - Automatic Thread Grinders - Optical Comparators - Automatic Opening Threading Dies and Chasers.



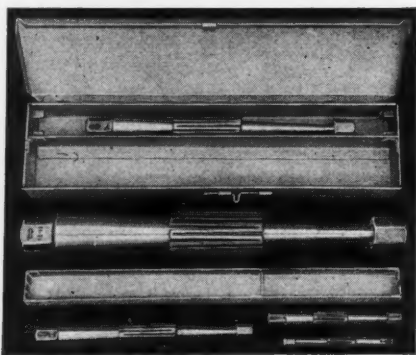
saving steps, and the result is increased output.

Now, in conclusion - there are 2 things I want to emphasize particularly to all of you in connection with this matter of employing women:

Don't get right up to the dead-line without making preparations.

There are two vital advance steps which must be made.

The first has to do with toilets and rest room facilities.



M101 Set has a range from $\frac{3}{8}$ " to $2\frac{1}{2}$ ".

No.	Range	Wt.	Price
M0	$\frac{3}{8}$ " to $\frac{1}{2}$ "	3/16	\$4.50
M1	$\frac{1}{2}$ " to $11/16$ "	$\frac{3}{8}$	5.75
M2	$11/16$ " to 1 "	1	7.75
M3	1 " to $1-9/16$ "	$2\frac{3}{4}$	12.00
M4	$1-9/16$ " to $2\frac{1}{2}$ "	9	22.00
M5B	$2\frac{1}{2}$ " to $3\frac{1}{4}$ "	$17\frac{1}{4}$	44.50
M5C	$3\frac{1}{4}$ " to 4 "	$30\frac{1}{4}$	44.00
M55	$3\frac{1}{4}$ " to $4\frac{3}{4}$ "	$42\frac{1}{4}$	89.00
M6B	4 " to $4\frac{3}{4}$ "	38	70.00
M6C	$4\frac{3}{4}$ " to $5\frac{1}{2}$ "	53	76.00
M5	$2\frac{1}{2}$ " to 4 "	$42\frac{1}{2}$	68.50
M6	4 " to $5\frac{1}{2}$ "	78	100.00

Immediate delivery of these sizes from stock.

Write or wire for bulletin M42-11H

K. O. Lee Company
Aberdeen, South Dakota

Entirely aside from obvious practical considerations, most states have laws dealing with toilets and rest room facilities for women.

If you are going to employ women you must install in advance, the necessary plumbing and the necessary rest rooms.

To get these things in time, you must put in your orders in advance, using your priorities to obtain the supplies you need.

You can't do this at the last minute. It takes time to get deliveries. If you are going to start hiring women in December, you must get in your orders for toilets and rest room equipment several weeks before.

The other point is that you must have a woman in your organization, a reasonably mature and experienced woman, capable of handling women's problems on the job, ahead of time, so that when you start to employ women they will have a woman supervisor to whom they can turn with their particular problems—a woman supervisor who will understand from personal experience the nature of the work to be done and the questions which will arise from the feminine viewpoint.

It is necessary therefore to obtain a woman of this type far in advance of the actual employment of large numbers of women. She should be brought in early, put thru a course of training with respect to the various operations involved, and made to understand that she is to function in the capacity of what you might call the "Dean of Women" for your organization.

She is not the boss—the foremen and the superintendents are the bosses. But she is the person to whom women can bring any questions dealing with the woman's side of the picture, and she is the person to whom the girls can talk frankly as one woman to another.

I can imagine nothing more disastrous than the situation of a company who, let us say, on December 1st, pub-

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Helping other Manufacturers in a pinch makes it easier for your Distributor to help You!

Have you ever benefitted by some resourceful Distributor's *borrowing* of tools or supplies that neither he nor you had in stock on a particular day?

Knowing his territory as he does, the Distributor usually knows what manufacturer has a temporary surplus of what—and can spare a supply until the stock can be replenished.

You *always* need your Industrial Distributor—not just as a telephone number or street address, but as Chief Headache Absorber for your Purchasing-Expediting Department.

Your Distributor is trained to give you a hand on Priorities, too.

Draw on his experience for obtaining the supplies you need. It certainly will be the exception if you don't meet men of your own measure—in fact we are sure they *will* be.

These same Mill Supply Houses have served for many years as this Company's Distributors of Cle-Forge High-Speed Drills and Peerless High-Speed Reamers throughout Industrial America.



The CLEVELAND TWIST DRILL
COMPANY
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES
30 REAR ST. NEW YORK 9 NORTH JEFFERSON ST. CHICAGO 840 HOWARD ST. SAN FRANCISCO
6410 SECOND BLVD. DETROIT LONDON "E. P. BARRIS, LTD." 39-36-37 UPPER FRANKS ST. E.C.4



Awarded May 22, 1942
Awarded July 13, 1942

Awarded August 8, 1942
★



"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU

lishes an advertisement asking for women to apply for employment and then, when the girls come swarming in, discovers that it has neither adequate toilet nor rest room facilities, nor a woman supervisor capable of handling the women's side of the personnel picture.

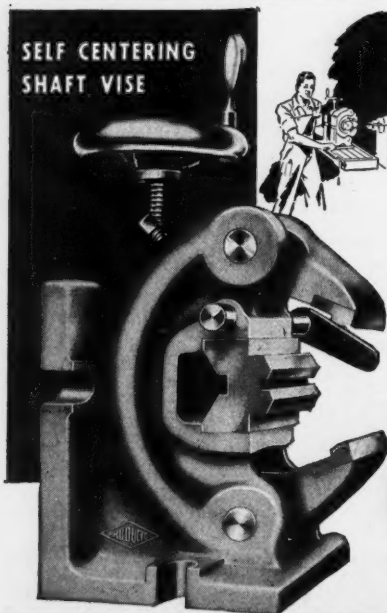
Let me urge you therefore, to take steps immediately with respect to these 2 points: first, the providing of adequate toilet and rest room facilities; second, the employment and training of a woman who will be in a position to act as the supervisor of women on the day when the rank and file of women employees start lining up at the employment office.

After all, it seems to me that the machine tool industry may well step out in the front line in this matter of employing women—because it has been due largely to the accomplishments of the machine tool industry that women can be successfully employed in the war production program.

Owing to machine tool development and design, the machine tool now does the physical work which formerly was done by the operator. The machine tool has within itself the precision and the power needed to get the job done. All that the operator has to do is have the intelligence and the dexterity to operate the machine. It no longer takes muscle to be a machine operator. It takes a certain type of craftsmanship, which the younger generation of Americans have shown they possess to a very high degree.

To my mind, it seems very natural that the girls of America should be able to learn this craftsmanship just as well and as rapidly as the boys. Since the industry has largely been responsible for eliminating muscle power as a requisite of factory employment, I think we may as well take our medicine, and recognize that on the whole, women can operate machine tools and build them as well as men.

SELF CENTERING SHAFT VISE



a Natural... IN ANY SHOP

This modern machine vise is a "natural" because it just naturally is an asset to any machine shop. For machining slots and keyways in shafts and spindles, $\frac{3}{8}$ " to $3\frac{1}{4}$ " diameter—suitable for horizontal or vertical mounting. Setting of vise remains unaltered for all work diameters—insures accurate radial cuts. Hardened V jaw reversible in vise—equal movement of two jaws locates shafts correctly in V jaw.

Base size 8" x $7\frac{1}{4}$ ". Approx. wt. 80 lbs.

Write for circular.



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